Lowell Textile Journal

TEXTILE ORNAMENTATION

By FENWICK UMPLEBY,

Headmaster of Woolen, Worsted, and Designing Departments of Lowell Textile School, Lowell, Mass.

I.

After spending much time in observation and study in the great museums and exhibitions of art and manufacture, where all kinds of fabrics and textiles from all nations and of all epochs are to be seen, examined and admired, the only conclusion arrived at is that the technical schools have a very great work to accomplish before they can hope to reach, much less to surpass, our forefathers in design and manufacture.

It is the duty of all students of design to avail themselves of the many advantages open to them; to take the trade and textile journals, to visit museums and art galleries where suggestions and ideas for all classes of work are to be had. Admitting that the weaving of textile fabrics generally has reached a very high, and perhaps unsurpassed, degree of perfection, we must allow that we have not yet attained to the standard of excellence shown by our forefathers in ornamentation in the various branches of this art, therefore it is the incumbent duty of students to leave nothing, that is possible, undone in order to develope a genuine artistic taste in all classes of society, more especially in those whose business it will be to cater for this taste. On it our trade and commerce very much depend, and without such artistic taste, we cannot hope to gain much supremacy in the market.

The art of manufacturing textile goods dates from the very remotest periods. We read in the book of Exodus, that the curtains for the tabernacle were of fine linen. It was from the Egyptians that we received the first authentic information on record on the art of weaving. Thousands of years before our era, the Egyptians, Indians, Phœnicians and the Assyrians, wove materials which were adorned with exceedingly intricate and ingenious designs; the plain fabrics were very fine and delicate in manufacture. Herodotus speaks of

linen made of a thread finer than a hair, twisted and made of two strands; this gives us the idea of either very great skill in hand spinning, or otherwise of very great perfection of machinery.

It may be inferred from the Scriptures that fancy weaving or decoration in stuffs began with simple needle work and embroidery. We find that the Mosaic law required the sacred vestments to be adorned with embroidered ornaments. The chief manufacture for which the Israelites were famed was fine linen, and this material was much worn in the sanctuary.

In Ezekiel xvi we read of broidered work, fine linen and silk. These fabrics were considered the proper raiment; in another chapter we read of wool, and again Ezekiel reproaches women of his time for adorning themselves with garments that were made attractive with embroidery. We may, therefore, conclude that needle work and embroidery were the first methods of ornamenting textile goods. In the book of Proverbs we learn from the inspired writer that women were not only acquainted with manufacture, but in the habit of spending much time in spinning, weaving, etc. Proverbs xxxi—"She seeketh wool and flax and worketh willingly with her hands." "She layeth her hands to the spindle and her hands hold the distaff." "She is not afraid of the snow for her household, for all her house are clothed with scarlet." "She maketh herself coverings of tapestry, her clothing is silk and purple." "She maketh fine linen and selleth it, and delivereth girdles to the merchant." Job also mentions "My days are swifter than a weaver's shuttle." Thus, it is evident that manufacturing textile fabrics by weaving and spinning, as well as the art of ornamenting them, dates thousands of years before our era. These extracts prove, too, that this employment was one of the earliest of human inventions. As to the modes of manipulation in manufacture adopted by the ancients, we have no positive record, although it is very probably that the process was similar to the methods practiced by the natives of India. Of this we are certain, the spindle and distaff were the chief implements employed in transforming raw material into a thread, and it is said that those simple instruments have been, from time immemorial, used for spinning in all countries engaged in manufacture, and are still employed in India and in some parts of Scotland.

In Homer's poems, which were preserved by the posterity of Cleophylus, and gathered together by Lycurgus, who was the first to give them tothe world, about the time of Solomon, some

nine hundred years before the Christian era, we read that the heroines, Helen, Circe, Penelope, and Calypso, employed their leisure time in needlework and embroidery, and they are frequently spoken of by the poet in connection with their spindles, distaffs and woollen stuffs.

Amongst the Egyptians embroidery was a common employment in all grades of society; this household occupation was common amongst the Assyrians, the Indians, Persians and the Chinese—these nations worked the material with the greatest delicacy. Robes manufactured for persons of distinction were enriched with very complicated and ingenious designs, were wrought in gold threads, and were of enormous value.

The Babylonians were great masters in the art of decoration, including embroidery. It was at Babylon where we produced those magnificent and marvellous coverings for the couches set apart for the guests at the great banquets, and which are said to have cost thirty-two thousands pounds sterling. The Babylonians also were also very skillful in weaving large designs of many colors; their cloths were very rich, woven with figures of animals, fishes and birds; sporting subjects also ornamented their fabrics, as hunting, fishing and shooting; their brocade included those subjects for design. The colors mostly used included scarlet, blue and purple, enriched by gold and silver threads.

Silk seems to have been for a very long time the monopoly of China (some writers say the exclusive monopoly of the Chinese) until the second or third century before the Christian era, and it is very difficult to say exactly when it first found its way from China to Egypt. In the books of Ezekiel and Proverbs, we read of this precious thread, but there is much doubt as to the translation of the Hebrew word then used; some historians affirm that silk was unknown to the Israelites. It is, nevertheless, true that the Egyptians had some knowledge of a thread very much like silk, procured from certain worms, which they spun and manufactured into a material of a very thin and transparent character, and of a very silky appearance, but said to be of an unsubstantial nature. It is natural for us to come to the conclusion that each country or people would use such materials as were obtainable by them and we find that wherever civilization has found a footing the people have found traces of ornamenting textile fabrics made from such materials as their country produced. In the absence of silk, which had not found its way into Egypt until the second or

third century before our era, cotton, linen, flax and wool, with gold and silver thread interwoven, sufficed the Egyptians in the manufacture of their textile goods.

We gain some idea of the quality of the fabric, and of the skill of the Egyptian workman, by examining the piece of mummy cloth exhibited in the British museum, sent to England by Mr. Salt. It is a piece of linen made from a thread, one hundred hanks to the pound, or eighty-four thousands yards in one pound avoidupois weight; one hundred and forty threads per inch in the warp, and sixty-four picks per inch in the weft. In his "Handbook of Textile Arts" to the South Kensington museum, the Very Reverend Daniel Rock, D. D., tells us of a cloth or piece of linen obtained at Thebes which has one hundred and fifty-two threads per inch in the warp and seventy-one picks per inch in the weft. We read in Exodus of the very extensive use of gold thread or wire and twisted linen, also of the workmanship and manipulation in making the gold thread—"And they did beat the gold into their plates, and cut it into wires, to work it in the blue, and in the purple, and in the scarlet, and in the fine linen, with cunning work" (Exodus xxxix: 3)—thus giving us their ideas of the perfection of color, and leaving us to imagine that their "cunning work" was the result of superior skill and of great ingenuity. The inspired Psalmist, speaking of the king's daughter, says, "Her clothing is of wrought gold, and she shall be brought unto the king in raiment of needlework" (Psalm xiv: 13, 14.) Herodotus, speaking of Egyptians workmanship, tells of a piece of linen which was especially to be admired, as each twisted thread contained no fewer than three hundred and forty strands and upon it were interwoven vast numbers of figures of animals. From these extracts we may be assured that when they could card and spin cotton, linen and flax to such a high degree of perfection, the fabrics produced from these fibres must have been beautiful, and therefore, they could not afford to dispense with silk. The Egyptians were satisfied with the products of their own soil, along with cotton imported from India, which was manufactured into textiles. They were most famous for striped cloths, figured fabrics, plushes and velveteens, and for other curious fabrics, specimens of which are to be seen in many of the public museums. It is very evident from the book of Exodus that needlework and embroidery were the chief methods adopted for ornamenting woven goods amongts the Jews,

but the word embroidery may in some instances refer to weaving and not always to the work of the needle. Egyptian tapestry was ornamented with paintings as well as embroidery. We read in the book of Proverbs (vii: 16), "I have decked my bed with tapestry, with carved works, with fine linen of Egypt." Doctor Rock, in his work on "Textile Fabrics," renders the text, "I have woven my bed with cords, I have covered it with painted tapestry from Egypt." Thus we find that linen was not only used as household furniture amongst the Israelites, but that it was really manufactured in Egypt. It may here be asked, how was it that the Egyptians did not avail themselves of the valuable discovery of silk which, according to the Chinese historians, was in existence upwards of three thousand years before our era? We may answer in the first instance, as previously stated, that probably the Egyptians were content with their own productions, namely, linen, flax and wool. When the Jews were emigrating from Egypt, from whence they procured their costly materials, they had no silk included in their valuables, nor do they seem to have had knowledge of any fabrics except linen, cotton, flax and woolen. Secondly, it may have been owing to the very jealous disposition of the Chinese people, and to their desire to keep the monopoly of the manufacture to themselves, for at last, when the silk worms were brought to the west, they were carried from the country by stealth; or it was because that they shut themselves up from all communication with the west, so that if silk had been manufactured in quantities large enough for exportation, it would have found no outlet for exportations to other countries. The Chinese are a very suspicious people; if they had any project advanced to them by a foreigner, which ought to be to their mutual advantage, they would cheat the foreigner out of it if they could, but will not generally accept any foreign innovation which would prove a benefit to both parties. We must give them credit for being exact, but of small ideas; they are industrious, but conservative in their notions and habits, hence the great similarity between their designs for textiles of some thousands of years ago and those of the present day. We must now return to their remarkable manufacture of silk, which they undoubtedly kept to themselves so very many centuries. Aristotle is the first Greek author who mentions the valuable insect, the silkworm. He states that silk was first woven on a small island in the Grecian Archipelago, named Cos, the modern name of which is Stanco. At this place

the ancient writer tells us of Pamphile, the daughter of Platos, is reported to have first woven silk.

II.

Mr. Pariset, the famous author of the "History of Silk," tells us that the Chinese Emperors reserve silk for the magnates of the empire. We know they were very careful to keep the manufacture of it to themselves. Not only did the emperors manage the manipulation of this precious thread, but they had it manufactured under the roofs of their palaces. We have it from the very best authorities, that when the Celestial empire was split up into so many feudal states, all the courts of the empire vied with each other which could have the most magnificent and most gorgeous costumes, and each state engaged and employed the best workmen and the most skillful artisans to be found, such as thoroughly understood the working of silk. The Chinese people are quite devoted to their precious thread; when the Emperor Chun was traversing his extensive dominions, and had arrived at the foot of Mount Tal where he received the hommage of his vassals, these dependents presented to him such articles as were most likely to please him, the presents included silk and woollen fabrics, raw silk, and fabrics of many colors. The Emperor Le Wang wore robes of extreme splendor, made from silk and gold brocade; this emperor was an enthusiast on the subject, having silk manufactured in his palace. The Chinese had, nevertheless, worn this costly thread some three hundred years before the Empress Si Ling Chi discovered how to give it its full gloss, lustre, and brilliancy. It is very astonishing that we have no record of any silk having been found among the ruins, or in the tombs, of ancient Egypt. The absence of this fabric leads to the belief that the silk mentioned in the books of Genesis, Proverbs and Ezekiel, must have been a material derived from some worm, other than the Chinese true silk worm. The anecdotes relating how silk first found its way out of China, and ceased to be the monopoly of its very careful protectors, are not only curious, but of a most interesting character, showing how diligently the liberator of this sacred material must have planned and studied to free from bondage an article which was welcomed by all the nations of the globe, and which had been watched and guarded with all the care of its jealous country.

According to a Chinese legend, a certain King of Khotan obtained the Emperor of China's daughter in marriage; when the Chinese princess was departing from her

native country for her new home, she was much tempted to take some of the costly material with her; but how was she to take it unperceived; how take this much valued substance to which her native country owed so much of its wealth, its magnificent and glittering costumes? Like all others of her sex, she was full of contrivance and deep thought, and at last she hit upon the device to take germs of this precious little worm from its native home. It occurred to her to conceal these small particles in her head dress—for who would dare lay rude hands on her fair locks? Procopious tells us that it was not till about the middle of the sixth centuary that the true silk worm eggs were found within the walls of Byzantium. Some Greek monks lived a long time among the Chinese evangelizing certain Indian regions. During the time, they learned the whole process of breeding, rearing and hatching the eggs of the silk worm, and no doubt, gained some knowledge of the manufacture of the thread into a fabric. When these devout men returned to their own country they, also, were unable to resist the allurement of this precious article, and they contrived to have secretly and skillfully concealed in their walking sticks or bamboo canes a quantity of the eggs of the insect. When they arrived at home they made it their duty to explain to Justinian the real value and use of their secret treasure, and for their endeavors and the attainment of their efforts Justinian rewarded them very handsomely.

The products of these eggs having thus found their way beyond the frontiers of China, were very quickly distributed over Asia Minor and Greece, and it was not long before the secret penetrated Persia and then found its way into Italy, and later into the west of Europe, and it was thus that a valuable commodity, which had so long been the exclusive monopoly of China, became the source of gain to other enterprising nations. The Grecians and Romans were at periods given to great excesses and extravagance in their costumes and modes of decoration and ornamentation; they wore robes of brilliant colors and garments of extremely skillful workmanship. Plutarch tells us of Demetrius, surnamed Poliocertes, a man of great magnificence and of wonderful power (at the age of twenty-two he commanded an army in Syria, but he was very vain and pompous and loved to display grandeur in his apparel). He is said to have been more like a theatrical player than a king, for he not only affected a superfluity of ornament in wearing a double diadem and a robe of purple interwoven with gold, but

he had shoes made of cloth of gold, with soles of fine purple, and he had engaged for his benefit artists in the ornamentation of textiles, for we read he had a robe that occupied a very long time in weaving, of the most sumptuous magnificence, both in color and design. The figures of the world and all their heavenly bodies were to be represented upon it. So gorgeous was this robe that none of his successors would ever presume to wear it.

Again we read that when Alexander the Great, having made himself master of Tusa, was searching in the King's palace, he found, amongst other riches, furniture of exquisite design, and of inexpressible value; there was purple of Hermione, worth five thousand talents, which, though it had been laid up a hundred and ninety years, still retained its first freshness and beauty. As we have to speak of this rich color (purple) several times, it will be as well to give some idea of its value. The total worth of the purple just mentioned amounts to the immense sum of nine hundred and sixty-eight thousand seven hundred and fifty pounds (£968,750); a talent is worth in English money one hundred and ninety-three pounds and fifeen shillings (£193. 15s. 0.) This purple of Hermione is not only very difficult to obtain, but very costly in its production. Pliny tells us that a pound of double dipped or twice dyed purple in the time of Augustus, was sold for a hundred crowns. The reason that is assigned for this beautiful color retaining its permanency, brilliancy and lustre, is that the purple wool was combed with honey, and the white wool with white oil. This fosters the idea that the material was dyed in its raw state, or as we commonly term it, "wool dyed," and we are assured that specimens of the same kind and age are still to be seen in all their freshness and lustre. Purple was with the ancients, considered a color of great dignity, and was, therefore, much prized by the Greeks and Romans; it was regarded by them as a prerogative of soverign power. Plutarch says Galba was the richest of private men, but of a very parsimonious character; his pride was not in dress and gorgeous costume, but in strict economy and temperance. Galba was requested by Titus Venius to put on the robe of dignity, and accept the imperial purple. The question may here be asked, what is this rich color, and from what is it derived? This rich color comes from the East, and especially from Phœnicia; it seems to have a great peculiarity, which does not appertain to colors of our day; instead of fading like most other bright colors, as reds,

violets, and blues, it retains its color as long as the material lasts. According to tradition, this wonderful color, which gains in intensity and brightness by exposure to the sun, and hence one reason of its great value to the ancients, was discovered entirely by chance. A shepherd's dog, driven by want and hunger to the sea shore. devoured a certain shell-fish, and therewith dyed its mouth so brilliant a color that it excited the admiration of all who saw it.

This small shell-fish is supposed to have been the "murex" the translation of which is "dye" of the fish, or a shell-fish. The murex is about the size of a walnut, and of the family of wolks, and when washed by the sea it adheres to the rocks in the same way. The Abbe Raynal says. "No color at present known can be compared to it, either as to richness, lustre, or permancy, and it is quite evident this is the source from which the Sidonian, Phœnician, and Lyrian purples were obtained." M. de Tautley tells us that when he was in the neighborhood of Sidon, he came across large accumulations of these shells, and at Pompeii there were found near the workshops of some dyers, heaps of the shells of murex, and they all bore the marks of the millstones, leaving no doubt that this costly and magnificent color had been extracted therefrom. We may also mention that the Romans were acquainted with other dye-wares. Vitruvis speaks of the madder plant as one of the ingredients used in the purple dyes, and also of the Pastil (Isatis) (generally termed woad or dyer's woady) Kermes grains, weld or wold, cudbear, indigo, and carmine, all of which have been known to the ancients from time immemorial. Vitruvius again tells us that the Romans extracted many rich colors from plants, fruits and flowers. Whatever were the methods adopted in dyeing by the various nations in olden times, we must necessarily acknowledge that the ornamentation and embellishment of textile fabrics have advanced step by step—the embroideries on the one hand, and the dyes on the other—and by combining these two, the ancients have contributed, in no small degree, to art in the adornment of textiles.

Amongst the Romans there was an indispensable custom of carrying the spindle and distaff before a bride when going to the nuptial ceremony, and the Roman housewives and matrons are said to have made garments, not only for their own use, but also for the wear and adornment of their husbands and sons. Augustus, we are told, usually wore robes of exquisite design, made by his wife, sister and daughter. Still we cannot say that

the Romans were born artists; in fact, before their intercourse with artistic nations, they knew nothing of the dignity of art; they were a people much given to pleasure and sport, and the higher grades of society took more delight in the amphitheatre, witnessing a bull fight, and in the performances of the circus, than in the cultivation of any works of art. The fine arts were introduced into Rome by Marcellus, who prided himself on being the first who taught the Romans to admire these works, and it was in his life that they began to devote a part of their time to disputing about arts and artists, thus they gained culture, advancement, and refinement from the nations with whom they came in contact. Accordingly, they adopted the arts and fashions of the people who were overcome by them, and we have no reason to doubt that they learned the practical part of manufacturing textile goods from those whom they oppressed, and so it was that an art, which had flourished with the Greeks, Egyptians, Persians, and Chinese, from the earliest times, began now to develope itself in Rome, and from this time the people spared no pains to equal, if not really to outstrip, their instructors. They are said to have excelled in certain kinds of embroidery and needlework, and to them the credit is given of inventing true lacework, called the "Scututata vestris," which was worn by persons of good position. This lace was worked on the garments with the needle. They adopted silk as a dress material about the first century before our era, and it became so common that it was worn by men and women, and by all classes of society. It was manufactured into so very fine and transparent a fabric that it was very objectionable as a covering, and Elagabalus is said to have been the first emperor who wore these silken garments. We have no very encouraging accounts of ornamentation in wearing apparel during his time, as he lived a very wicked life, a life of debauchery and cruelty. Tibullus speaks of this gossamer substance, and describes it as "lighter than the wind and clearer than glass." Seneca, whose morals seem to have been of a very doubtful character, condemns this flimsy fabric, which he says is a protection neither for the body nor for shame. So unbecoming was this gossamer attire in the commencement of the new era, that by a decree of the Roman Senate (Tiberias A. D., 16), men were forbidden to wear and disgrace themselves with silken attire. We read of all nations and tribes being given to ornamenting their dress or their bodies, therefore we are justified in saying that

nothing new has been invented; we have but rediscovered, and possibly improved upon, the means employed by our forefathers, as we shall try to illustrate in following chapters.

TALKS WITH BEGINNERS IN DESIGNING.

I.

At least four thousand years ago, and hundreds of years before the Crown Egyptian cotton was introduced from India and first grown on the banks of the Nile, the Egyptians wove and designed fabrics. Most of these early cloths were of linen though some white wool garments were also in use. Cloth ornamentation or designing at this early period was accomplished by means of painting the fabrics; later, needle work figures were employed in ornamenting and finally the mechanical device known as the loom came into use, for this as well as for weaving cloth. After the passage of all these great periods of time we have improved wonderfully in the direction of rapidity and ease in manufacture rather than in the product of our brain and looms. The people of India are known to have made very beautiful muslins long before Amesis sat upon the throne of Egypt and many rich heavy fabrics are known to have come from that country.

The number of years given at the opening of this artical for the begining of this manufacture is the first well authenticated date, but even if we add two thousand years, making the invention of cloth 4000 B. C., we are, probably, still erring on the side of conservatism. What we intend to deal with in the succeeding pages is the art of ornamentating fabrics as in use by us at present, and as the ancient weavers produced from their looms the first plain cloth that ever existed, we will endeavor to give the student an idea of its construction, for it is in common use in our mills to-day under the name of the cotton or plain weave. All simple fabrics are composed of two sets of threads termed respectively the warp and the filling. The warp is that set which runs through the entire length of the cloth; the filling is placed at right angles to this, or across the cloth. It is the interlacing of these threads which is known as the weave while the combination of several weaves in one fabric or the interpretation of this cloth on paper is known as the design. This design or plan of

the cloth is always made before the warp and filling are brought together to form the fabric: otherwise it would be like endeavoring to build a house without first laying its foundation. The paper in use for designing is ruled in squares or oblongs with heavy squares ruled over them containing anywhere from 32 to 288 spaces each, but the kind that we will useat first will be known as 8x8 as seen in Fig. 1. The spaces running from the top to the bottom represent the warp threads while those at right angles or across the paper are the filling threads or picks.

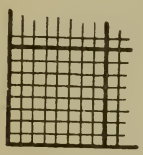


Fig. 1.

This should be clearly understood at the start, the spaces and not the lines are referred to. Thus Fig. 2 show three warp threads and Fig. 3, three filling threads. These later we will hereafter speak of as picks. When a square on the designing paper is black (Fig. 4) it means that in the cloth, the warp thread at that particular intersection with the pick rises and goes over the filling thread. Fig. 5 is a sketch of three black warp threads and three white picks in the position they assume according to the plan in Fig. 4. Observe that the black square in 4 represents the middle warp thread as rising over the middle pick. The other eight squares are left blank, meaning that the filling is above the warp at those intersections. The simplest interweaving of filling and warp is known as the plain or cotton weave. This is represented in Fig. 6 as it appears on the designing paper. Fig. 7 is a picture of the interlacing of two black warp threads and two white picks. Of course this simple weave must repeat itself hundreds of times to form the cloth as we see it every day in our bed linen, ginghams, handkerchiefs, etc. To understand the actual combining of threads to make this fabric we must look at the loom thatis to do the work ; and as most of my readers who wish to get some knowledge of designing have either been about looms, more or less, or possibly worked on them, I will touch briefly on this subject. We will assume that the beam or roll which holds the warp yarn contains two thousand threads side by side and each thread several thousand yards long. These have been wound tightly, a sheet of yarn, upon the beam, which in turn is placed in the loom. The ends are now brought forward and drawn through the heddles on the two harnesses.

Fig. 2.

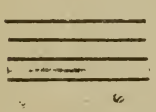


Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Every other thread is passed through the holes of the heddles of of the back harness and the alternate threads are passed through the heddles of the front harness. Thus we have one harness containing one thousand alternating threads and directly in front of it, about an inch away, we have another with the remaining thousand threads held up by its heddles. These two thousand threads are now drawn forward to the reed (Fig. 9), a set of stiff flat wires set closely together. A certain number of threads go between each wire and its fellow. The warp threads are now attached to the roll at the front of the loom by means of a piece of cloth and we are ready to experiment with the harnesses. When we raise the back harness slightly and depress the front harness in like proportion we raise 1000 alternate threads and depress the other thousand, thus forming a long triangular opening (Fig. 10), the reed making the perpendicular side of the triangle. Now pass the shuttle through this shed, as it is generally known, and we have the first pick. Next, raise the front harness and lower the back one, thus bringing the lower thousand threads to the top, the upper thousand to the bottom and the next shed is formed. Again the shuttle goes through and we have our second pick. Continue this operation; the reed each time pounding the filling into its place, and we are making plain cloth. An immense variety of beautiful dress goods are made on this weave by merely coloring certain warp threads and their corresponding filling. Let the student, for example, fill in a design of 33 by 24 squares on the designing paper with plain weave. In other words 33 threads by 24 picks. As the threads are lengthwise and the picks are across of course, the whole design will be oblong in shape with the thread running toward the top of the paper. We will dress this warp two and one with a color scheme of two red and one black. Assuming that squares have been marked for this weave with a dot on each square as in Fig. 11. We color the first two threads red with a colored pencil. See Fig. 12. The cross represents the first two threads or rather their lower ends as being colored. The dots are the same as in 11 and are the uncolored plain weave. Now color the third thread black with a

Fig. 9.

Fig. 10.

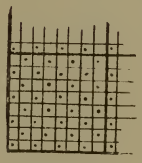


Fig. 11.

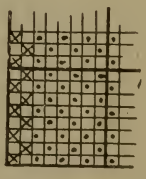


Fig. 12.

soft pencil. We next two should be red followed by a black one and so on to the last one. If you are correct, thread number 24 will be black. The next proceed with the filling. Half of the design still remains white and those white squares are the places where the filling goes over the warp. The color on the upper thread, be it warp or filling, is the one that is seen. In other words, if a black filling thread goes over a red warp thread, the red at the point of intersection is hidden and you see only the black. Then in this case as the colors in the filling are the same as those in the warp, two of red and one of black, we fill in the lowest row of white squares across the design with red. This is the first pick. The second pick also is red. The third black; then two red and one black and so on until the design is filled in. The last pick should be black in this case. It will be observed that the design has lost the checker board appearance that it had when only the warp squares had been filled in. It would be well for the student to make up a number of these color effects; small at first, but gradually becoming more elaborate. Very beautiful ginghams are made in this very simple way. We will now pass on to weaves requiring more than two harnesses, the


Fig. 13.

first of which, a three harness twill, is shown in Fig. 13. To repeat this weave proceed as in Fig. 14. Any weave that has three squares in the warp and three in the filling is said to repeat itself on three either way. Thus, the plain weave repeats on two. In continuing a weave or repeating it construct it in the lower left hand corner of the designing paper: take for instance this three harness twill, it repeats on three in both warp and filling and occupies nine squares in all. After having placed it in the corner designated again construct it on the nine squares to the right and corresponding to the first set. Then construct it again above the first squares then to the right of the last and so on indefinately as in Fig. 14. Thus it will be observed that we have a weave running diagonally across the paper from left to right and with the white filling squares predominating two to one. On account of the direction of these squares toward the right, this weave is called a right twill, and because the filling predominates on the face of the cloth it is known as filling flush.

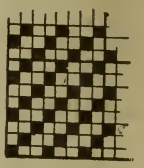


Fig. 14.


Fig. 15.

Another weave on three harnesses and the direct opposite of this one is seen in Fig. 15. This also is a three-harness

twill, the warp repeating on three squares and the filling also repeating on the same number.

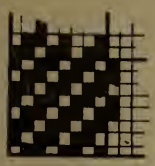


Fig. 16.

For a continuation of this weave see Fig. 16. This shows the warp predominating on the surface and making a warp flush weave, the twill being the same, right. Fig. 17 is a piece of cloth made from weave Fig. 15 with six threads and six picks, however. The warp threads in this are white. Compare each warp thread when it rises to its corresponding black squares in Fig. 16. It will be a good idea for the student to make a cloth sketch of the arrangement of warp and filling from the three harness, filling flush weave in Fig. 13. He will thereby get a better idea of the actual relation of the weave on paper to the threads and picks when combined in cloth. A good way to represent these weaves is to take two sets of papers in small strips, one set shaded with a pencil, the other plain white; calling the dark ones warp and the light ones filling, interweave these into filling or warp flush paper cloths. Before closing this first paper a very common but valuable weave will be added, the four harness chaloon twill (Fig. 18). This weave is used very commonly in making plaid (worsted) dress goods, serges, cheviots, fulled coatings, etc. Thousands of different effects may be made from this weave alone by the mere dressing of the warp. That is by the arrangement of the different colored warp threads. The student should fill up sections of paper anywhere from 24x24 squares to 96x96, and with colored pencils make cloth effects in plaids and checks as above instructed.

Fig. 17.

Fig. 18.

MAXENTIUS.

WOOL QUOTATIONS.

Penn. and Ohio fleece wool X and above	27	and	28c
Delaine - - - - -	30	"	31c
Unmerchantable - -	21	"	22c
Michigan No. 1 clothing and combing -	28	"	29c
Ky. and Ind. $\frac{1}{4}$ blood combing - - - -	23	"	24c
California pulled - -	50	"	53c
Texas (fall chois) - -	14	"	15c
Average - - - - -	12	"	13c
Montana fine - - -	16	"	18c
Scoured - - - - -	47	"	49c
Australian (scoured) superfine comb - -	70	"	71c
Queensland (scoured) comb - - - - -	65	"	66c
So. American scoured $\frac{1}{4}$ blood - - - - -	38	"	39c
Mohair - - - - -	40	"	45c

THE LOWELL TEXTILE JOURNAL,

PUBLISHED MONTHLY

—AT—

No. 67 Middle Street, - Lowell, Mass.

—BY—

THE LOWELL TEXTILE JOURNAL COMPANY.

W. M. HASTINGS, Editor.

G. A. LYON, Business Manager.

A. B. FELS, Treasurer.

Entered at the Post Office at Lowell as Second Class Mail Matter.

SUBSCRIPTION TERMS;

For one year postage prepaid - - - -	$1.25
Single Copies - - - - - - - -	.10
For Sale at all Newsdealers - - - - -	.10

Advertisements must be at the Journal Office before the twenty-fifth of each month for insertion that month.

Contributions may be sent to Editor of The Lowell Textile Journal and they will receive prompt attention.

PRINTED AND BOUND BY M. G. WIGHT & CO., LOWELL.

EDITORIAL.

In placing the Lowell Textile Journal in the hands of the public we fully realize that a new style of textile magazine is necessary; one that shall contain information that the average mill man, or he who intends following this life will be the better for knowing; and also a journal that is in direct touch with some of the largest manufacturing cities in the United States.

We are prepared to give articles by well-known, practical men on important mill questions and on many kindred subjects.

Although this undertaking is by no means an easy one we are confident that with the aid already extended by our many friends we shall produce a sheet that will be of interest and use to our readers.

One of the most progressive ideas that has been put into execution in this State in a great many years is that of Mr. Hildreth in establishing a class composed of overseers, pattern makers, draughtsmen and machinists of the Lowell Machine Shop for their further advancement on certain lines of his own construction. These men are highly skilled, and this fact only goes to show the value which Mr. Hildreth attaches to the more advanced education of men in his employ.

The cotton department of the Lowell Textile School has been the place where this earnest, studious set of men have wrestled with difficult problems on delicately adjusted, intricate machinery under the management of the head of the department, Mr. Hedrick.

The days when young men were put into mills to "knock 'round" the different rooms, picking up what they could, and taking short answers from men who had no time, or very often, inclination to explain work to them, seem, happily, to have passed away.

When a direct premium is placed on knowledge and we do not have to spend the best years of life in gaining experience, it certainly

looks as if the conscientious youth could gain a competency before he is too old to enjoy it, and the manufacturer a higher grade of production with the consequent easier disposal of his goods.

The statements made by the Right Honorable Charles T. Ritchie of the London Board of Trade in his speech of Nov. 23rd before the Chamber of Commerce seem to indicate that the manufacturers of this country are enterprizing and pushing enough to snatch orders from the very jaws of the British Lion.

"There is," he says, "no doubt the United States are executing orders which ought to be executed here. We all know an American firm obtained the contract for the Central Underground Railway (of London) as its bid was lower than those of the English concerns, and it could deliver the supplies three months ahead of the British tenders. Many important continental orders have gone to America. The same may be said of Egypt and Japan, where the Americans are doing work that Englishmen should have done."

We must say that this state of affairs is very flattering to the people of our own country although it is but a just tribute due to clear headed foresight and keen business capacity.

Although extremely sorry that Mr. Nichols would not allow us to publish his lecture on ginghams we can only assure our readers that they are missing a rare treat.

EMPLOYER AND EMPLOYEE.

It is a pertinent fact even to the most casual observer of mill affairs, that help are, to use a hackneyed expression, "their own worst enemies," and, that the not infrequent cut-downs, which sometimes assume the form of increased labor without a corresponding increase of wages, are due to the greed, rivalry and emnity, of the by no means most ignorant class of employees. This produces a condition of affairs both on day and piece work, that those in charge are actually obliged to take advantage of in their endeavor to preserve harmony and to do conscientiously that for which they are in turn employed.

. . .

Because a person is in your employ is no reason that he or she is your inferior; nor is it an indication of your inferiority that you are not your own master.

. . .

The mill manager or overseer who seeks by unfair means to gain that which could have been accom-

plished, harmoniously, by fair means, loses both the respect and good will of his help, two qualities that are essential to good management from many points of view.

. . .

Excess of discipline is as evil in its effects as a corresponding lack of it.

. . .

The reason that there exists in the minds of employees in general, the idea that they are not paid the equivalent of their labor, is, undoubtably, the result of the present wage system.

. . .

The needless brutality exhibited towards undeserving defenseless female employees by some overseers, is one method those gentlemen have of demonstrating the superiority of man over woman.

. . .

The influx of Polish, Portuguese and Armenian help into the cotton mills of the present, bid fair to do for the English, Irish and French, what they in turn have done to the "Yankee" mill boy and girl of the past.

. . .

The manager who is popular with that portion of his help with whom popularity is possible, is the man who wins their respect and keeps it.

For the sake of minimizing your broom bill, it is false economy to allow a man earning ten cents an hour to spend half an hour sweeping a ten minute space with a six cent broom worn down to the stick.

. . .

The man who has a decided penchant for pretty faces must never expect to be able to manage a room full of women successfully.

. . .

The crass ignorance of some employees is only equalled by the stupidity of others.

. . .

The successful mill manager must necessarily be a shrewd observer of affairs about his factory, but this is no reason that he should waste fifteen minutes of his time watching a shirking $3.00 a week cardroom boy while his $24.00 a week weaving overseer is having a half hour chat in the boiler room.

. . .

The persistency with which help disregard accident rules might explain the frequency of apparently impossible accidents.

. . .

The motif of labor organizations in general is supposed to be a means of the many to protect individual interests; but too often

they are used as a means to maintain certain individual's interests.

. . .

Because you think you are getting only one half of what you are worth, is no reason that the job you are on is worth any more than you are getting.

. . .

"Ignorance of the law excuses no one." Doubtless it is ignorance of the laws of politeness that begets, though it does not excuse, the scant courtesy (?) with which those in charge very often treat their employees.

. . .

The rapidity with which American, and Americanized help acquire in two years, and often less, a seven year trade, is either a tribute to the influence of American progressiveness, or a reflection on the laxity of the certain individuals for whom that work is performed.

. . .

The overseer who has the greatest difficulty in suiting his employer is generally the one who stands outside the mill gate during the noon hour and explains to apparently an admiring group how a manufactory ought to be conducted.

. . .

The man who would successfully manage a room should remember that an analytical knowledge of human nature is as assential as a profound understanding of the theoretical and practical sides of his trade.

. . .

It is difficult to understand the consistency of lubricating a five thousand dollar machine with an inferior brand of oil.

SHEDDINGS BY CAMS.

The method of shedding by means of cams is a thoroughly practical and economical way to obtain a good clear shed.

Of course it is well understood that one is confined to comparatively few harnesses and consequently to a range of patterns that is not large, nevertheless in doing small pattern work, cams hold the first place; and so far as it is possible to use cams for shedding purposes it is certainly advisable to do so.

For example, look for a moment at a number of harnesses worked by the dobby motion and then at the same number run by cams. The first is a complicated mechanism, dependent for correct and

satisfactory results on the exact timing of a number of parts and also upon a number of springs which in themselves are decidedly an unknown quantity. Furthermore the greater the number of parts there are in a machine, particularly in a confined space, the greater amount of fixing there must be, and a consequent loss of production. This being, of course, of vital importance in this age of competition.

Now let us look at cams; everything depends upon the construction of the cam whether the results are good or not, for if the cam is so constructed it imparts a jerky movement to the harnesses—then you must expect poor cloth from the constant breaking of the yarns and the breaking of the healds themselves. In fact the jerky movement will throw everything out of order. A cam that will impart an even motion to the harnesses is a matter of the first importance.

Care should also be taken to see that the heddle bowl will be in

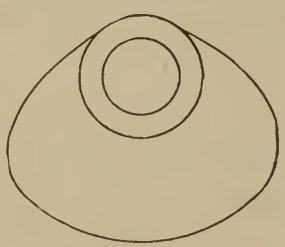


Fig 1

contact with any part of the cam in its revolution while imparting motion to the treddles, and there should be an even rise and fall on the shake of the cam with no sharp curves. Notice Fig. 1 and 2.

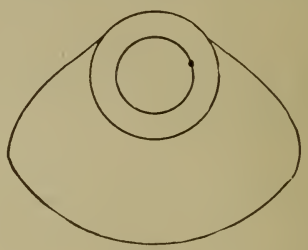


Fig 2.

It should also be understood that two cams of the same dimentions will impart different motions to the harnesses because the back harness connection is set in a different part of the treddle from the front connection.

In looking over the Fig. 3 it will

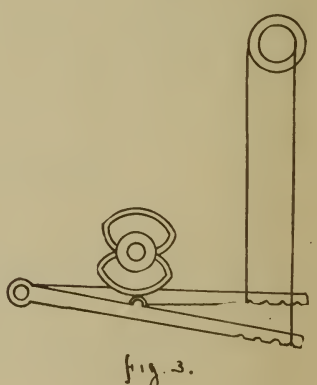


Fig. 3.

be readily noticed that the front harness will be raised higher than the back one. To overcome this objectionable point, the loom makers bring into use a larger set

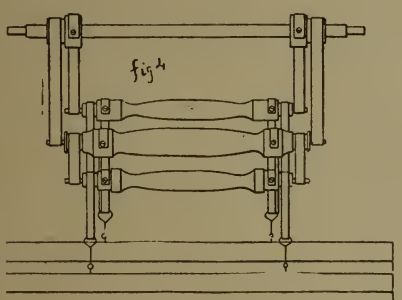
collar, and to this collar is attached the strap that is connected with the back harness. The set collars are attached to the harness roller at the top of the loom.

The cam Fig. 1 will impart a thoroughly even motion to the harness, and can be recommended as one that will give satisfactory results, and there is dwell sufficient for it to be used in the production of cloth that requires cover.

Fig. 2 is the style of cam that was used in one of our largest mills, but as can be seen readily, it turned out to be a failure.

We will now notice a 5-end satine weave and compare the two different motions.

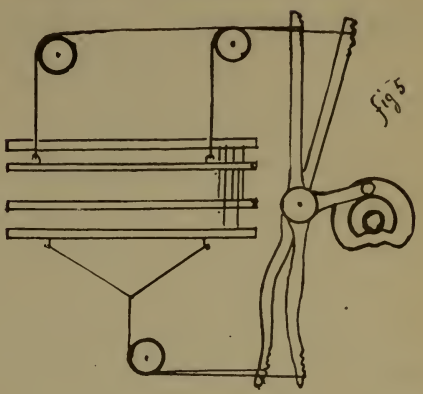
Glance at Fig. 4. This is



styled a top roller motion, and is one of the best that can be used for making satine weaves and is very extensively employed.

It is apparently a very complicated motion, but when once adjusted to the work it has to perform, the easy and even movement of the loom to which it is attached, amply repays for the little extra time spent on it at the outset.

Fig. 5 is another method of weaving a 5-end Satin cloth. All



that needs to be said of this motion is, that it is being driven out of the field of usefulness by the motion Fig. 4.

Fig. 5, though far simpler in construction than Fig. 4, looses in comparison by the fact that it imparts a very heavy movement to the loom and consequently is of little value. Production is the point aimed at in these hustling times, and so the question of the day is how much will this or that loom turn off in a given time, hence the necessity for an easy running loom, built to stand speed.

THE PROBLEM ANSWERED.

A Friend (staring). — Good heavens! What a collection of old hens for a chorus.

The Manager.—I know it my boy; but they are the only kind that can successfully weather a tour of one night stands.

LECTURE ON BLEACHING

By COL. F. A. WALSH,

Delivered before The Lowell Textile School.

It may not be amiss to give some idea of the first knowledge a bleacher has of the goods sent from customers. On the screen you will find what is termed an invoice of goods, and coming from a prominent converting house. You will observe that the entire story is told, namely: the lot number, the mill from whence the goods came, number of picks to the inch or comb, number of pieces, grey, width, description, weight, quality, then follows the bale numbers, instructions for finish, etc. Before you is a piece of the goods finished and unfinished.

The bleachry has a man in the grey room whose duty it is to look over the goods in a general way, seeing that they are as represented, and placing on each end of each piece the tar mark, this is of a black tarry nature and remains during the bleaching process, and when the goods are finished ready for the market enables the packer to identify the goods of each concern. It can be readily seen that given a number of pieces of similar count and width, each owned by different firms, they being all white, unless something of this kind were done, the result would be absolute chaos and confusion.

We will now pass to the operations. The goods being sewed end to end we now will call them lots, varying in length of from 500 to 800 pieces, 25,000 to 40,000 yards or 18 to 25 miles long, according to the number of yards to the pound of cotton.

Depending much upon the intended use to which the cloth is to be put is the question of the shearing and singeing.

The shearing is accomplished by a machine, such as is represented on the screen, and is made by the firm of Curtis & Marble of Worcester, and may be best described by an inverted lawn mower, that is, a spiral set of knives placed upon a spindle revolving near a stationary knife. This clips off the loose threads hanging from the surface of the cloth. For printing pur-

poses the goods require even twice shearing, one before and one after bleaching.

SINGEING.

In this, we have two kinds called gas and plate. The former is represented by the figure before you. You will observe that the cloth passes between a roller and a gas flame, the latter consisting of a succession of Bunsen burners, or, in other words, the air and gas are mingled in the pipe in the proper proportion to produce a colorless flame. As the cloth passes in front of the flame the nap or fuzz is burned off. To avoid fire in the cloth it is either passed through water or rolled into a roll immediately after passing through the singer.

The other kind of singeing, namely: plate, is perhaps the oldest and many prefer it. It is a little more difficult to control, and consists of a curved copper plate of the requisite width set in brick work with a place for a fire with coal or oil underneath. The plate is heated to a light cherry redness and the goods passed rapidly over and in contact with the heated surface, this burns off the fuzz or nap producing a good surface. The partisans of this kind of singeing claim that the surface is better singed and the spaces between the threads are not touched. As a matter of fact, the combining of the two systems is now finding favor, and in the machine represented and made by the Granger Foundry & Machine Co. of Providence we have alternate plate and gas, the three lower plates and two gas flames singe the face of the cloth, while the two top plates and one gas flame singe the back. The effectiveness of the singeing depends in a great measure upon the length of the staple in the cotton yarn; also the twist of the yarn from which the cloth is made. Short staple cotton will by constant friction even in well singed goods produce a fuzz or whiskers as they are termed in the dry goods houses. A loosely twisted yarn will also develop this peculiarity. In lawns or goods very shear, that is, whose yarn is of a very fine count and the number of picks to the inch being upwards of 100, the plate and gas machine is the best because not only the surface, but also the interstices of the cloth require to be

free from the nap. Experiments have been tried by heating the plate by electricity, also to make the plate revolve, but these are not in general use.

We are now ready for the actual bleaching or rather the preliminary treatments. In some works the goods after singeing are steeped in water over night or else wet out and allowed to soak, and then given the subsequent processes.

All are more or less familiar with the quick-lime so common in mortar or whitewash; this is the first material used in a bleach house. A good well burnt lime, that is a practically pure oxide of calcium, is required and after slaking, is thrown into a circular tank provided with a mechanical agitator and water added to make a milk of lime. Those of you who have followed chemistry at all will remember that lime is oxide of the metal calcium and is known among us as Ca. O. When water is added the lime combines with it to make Ca. H_2 O_2, or hydrate of lime. Bearing this in mind we shall have to digress and study the actual composition of the cloth we have in hand. We all have seen samples of cotton either in the bale or on the plant, and will remember how white it looks; yet, when woven into cloth and seen in the mass it has a brownish yellow color, light or dark according to the locality and soil; but in addition to this the manufacturer sizes his warp yarns by running them through a solution of boiled starch or flour or both with an admixture of a certain amount of grease, usually tallow, and sometimes chlorides of zinc or magnesia, these last to retain moisture and keep the threads well conditioned; besides we have the natural fat contained in the cotton itself. A glance at the amount of oil extracted from the cotton seed will indicate the kind of fat or grease last mentioned.

The first operations of bleaching have to do with the fats both natural and those added by the manufacturer. It is well known that if you add a little lime water to a watery solution of soap a curd will form consisting of a lime soap or lime in combination with the fatty acid of the soap; but in the cloth instead of a soap we have a natural grease composed of fatty

acids in combination with glycerine. Long continued boiling with alkalies, or hydrated alkaline earths, as slaked lime, causes the fatty acid to combine with the alkali or lime and setting free the glycerine. It is, I believe, a fact that freshly slaked lime has, in a superior degree, this power of splitting up the glycerines of the fatty acids. This same thing happens in the lime-boil as it is called. Let us now return to the weak solution of slaked lime. In regard to the quantity of lime used this depends in a measure upon the cloth, but about one hundred weight quicklime to seventy hundred weight of cotton is used. The milk of lime is run into a liming machine, as represented, consisting of a machine with two squeeze rolls at the top, about five feet long, and one roll at the bottom running in a trough. In the trough is the milk of lime. The cloth enters at one end and in a spiral way runs to the other end and out, occasionally it is entered in the middle and delivered at both ends. Alternately being dipped in the lime and squeezed between the rolls. In this way the cloth becomes well saturated with the milk of lime and is then led over drag rollers or winces and plated down by a man in the inside of the kier.

Nearly every bleacher has his pet theory upon the best form of kier and far be it from me to attempt to say just what kier is the best. We will begin by examining a low pressure or open kier. The earliest form of kier is represented upon the screen and consists of an iron or wooden cylindrical vessel or tank, provided with a false perforated bottom raised about 18 inches above the real bottom, and a central pipe with a bonnet or spreader over the upper end and a few inches above the end. In the well is the steam pipe for boiling. The mode of proceeding is to form the cloth into as compact a mass as possible and thus avoid circulation holes for the liquor to run to the bottom without leaching through the cloth itself. The water in case of the lime boil, the solution of alkali in

case of the soda or ash boil is let into the kier until the proper quantity appears and the steam turned on, the liquor in the well is brought to the boil and spouts up through the central or vomit pipe against the spreader and then on to the surface of the cloth, leaching through the mass of cloth and accumulating in the well to be again vomited, as it is termed, onto the cloth. It can readily be surmised that this is rather a wasteful way to boil, for radiation is necessarily great and steam means coal and coal money. Attention was early turned to the question of economy both in fuel and time, this resulted in a form of kier similar to the one represented, the drawing of which was kindly loaned by the Granger people, and is what is called a closed low pressure kier, or better an atmospheric pressure kier, for there is a vent pipe leading outside and, of course, removes any pressure; it also helps to keep up the circulation, yet the economy in this kier was slight, although so strongly are some wedded to this low pressure variety of kier that many of our good bleachers will have no other. They certainly minimize the risk of kier tendered pieces, the bane of a bleacher's life.

We now come to a closed pressure kier, namely: one run by an injector. Many varieties of this kier are in the market and in use, but this one will serve to illustrate the so called injector kier. The principal of this is that live steam passing through a small apperture will, if the proper apparatus is used, draw liquids along with it. We have here a similar arrangement to the open kier, although the vomit pipe is carried along the outside and the liquor spread over the goods by passing on the top of the umbrella shaped piece of iron within the kier. The out about the injector kier is that the injector "gets caught" or stops and hence circulation stops, resulting in imperfect boiling, and hence imperfect bleaching.

The next kier to which your attention is called is the Barlow high pressure kier and is in use in several concerns today. Here we have them in pairs. The steam is turned on over the goods and, as it is called, the cloth is blown down into a compact mass, steam is then

shut off and the liquor is then added and operation begins. Here we have a positive circulation, for when one kier is filled with the liquor the other is empty and then the liquor is driven by steam at 40 pounds pressure from the full to the empty kier and gains access to the cloth by the perforations in umbrella pipe in the centre. When all the liquor is over the operation is reversed. In other words, the liquor is alternately thrown from one to the other. We now will take up the Mather and Platt system of bleaching about which so much was said a few years ago. The kier boiler is open at one end and into which the water tight wagons or cages, whose bottoms are fitted with pipes to connect automatically with the circulating pipes, can be pushed, the door closed, and the operation of boiling begins, the circulation being kept up by means of the rotary pump. While the cloth in these cages is being boiled, cages on the outside are being filled ready to be pushed in when the kier or boiler is again empty. Caustic soda is also used in place of lime.

While in England last spring I was, by the kindness of the inventor's son, Mr. Colin Mather, shown through a bleach works where this system was in use, namely at the large works of Potter & Sons, at Dinting Vale, near Manchester. I am compelled to state that excellent bleaching was being done and at a low cost.

The kier now on the screen is called The Walsh kier and consists of an ordinary kier with a pipe entering the middle of the top and the liquor being apread over the cloth by the umbrella or bonnet. The feature of this kier, however, and one that has commended it to some of the prominent bleachers and printers of England and Scotland is the fact that positive circulation is guaranteed by a rotary pump and the lye is heated by passing through a coil of pipe in a drum filled with live steam. No steam enters the kier, hence the liquors are not diluted, and also caustic soda may be used in place of lime, although lime may be employed if desired. They also claim that the air is driven out of the liquor and hence, as heretofore, the caustic will not tender the goods. This claim is also made by the Mather system.

We now come to the Allen patent kier and is an attempt made to get rid of the center pipe and to have the manhole in the center, thus allowing good even plaiting down or packing of the goods. It consists of four pipes from the well at the bottom and re-entering the kier at the side near the top inside, the pipe is pressed into a long narrow apperture, this sends the liquor over the goods in a spray, and as can be seen, from four sides. This kier has found much favor within a few years, but requires careful handling. I may say that this kier, with some improvements is working with much success inasmuch as positive circulation is produced at the Lowell Bleachery. It is an injector kier, but with four pipes in place of one. The whole attempt is to provide for a perfect circulation and in the high pressure kier to shorten the time and save fuel. The time of boiling an open kier varies from 12 to 24 hours, in a high pressure from 6 to 8 hours. The amount of coal used in a low pressure or open kier is about one ton and in a high pressure about one half a ton, or a saving of from 30 to 50 per cent. Enough to say that each kier endeavors to boil the solution, and take this from the well at the bottom and spray it over the top of the goods and allow it to slowly leach through the mass of cloth. The cause of the tendering of the goods during the lime, particularly in the high pressure kier is a much mooted point. Chemical research has proven that it is caused by the action of the air jointly with the alkali changing the cellulose, which is the main principal of the cotton, into oxycellulose, a substance of a friable nature. Practical observation has deduced this statement that the tendering in the lime boil is due to insufficient liquor, the two conclusions are practically the same.

We will now proceed with the operations. Washing the cloth after the lime boil is necessary, and is accomplished by means of a machine before you. The washing machine removes the superfluous lime, also the starchy matters adhering to the cloth, leaving the cloth clean and much brighter, but the lime is united with the fats and must now be removed. This is accomplished by means of a bath consisting of a weak solution of

sulphuric acid, the common oil of vitriol of commerce, or a mixture of sulphuric and muriatic. The souring in the old way was accomplished by means of a large tank in which the goods were immersed, and is still in use, later the goods were run into the tank and showered with the acid solution. The most modern way is to have a tank about ten or twelve feet long and two to three feet wide and two or three feet deep on the end of which is a pair of squeeze rolls. The goods are dropped into the tank from a wince and allowed to soak in the acid solution, and then pulled out by the squeezer at the end. This allows about 50 to 100 yards being immersed at one time, but as the goods are run in as fast as the goods are taken out the operation is continuous.

In souring, the point is to bring every part of the cloth in contact with the acid. It is absolutely essential that the lime soap should be perfectly decomposed and also that the carbonate of calcium or carbonate of lime is also decomposed. This carbonate of lime is formed from the lime by contact with the air, and causes the extremely troublesome lime stains so well known to dyers. It has been commonly supposed that these lime stains are due to the insoluble sulphate of lime formed by the union of the sulphuric acid and the lime, and hence led to the use of the mixture of muriatic and sulphuric acids, for chloride of calcium $Ca\ cl_2$ is extremely soluble in water, but it is necessary to look deeper, for sulphate of lime is inert and does not dye, while carbonate of lime, $Ca\ Co_3$ will extract color from the dye bath and form a stain. It is also to be noted that subsequent treatment to which the cloth is put does not remove the carbonate of lime.

After souring, the cloth is then washed well and re-entered the kier for the ash or soda boil. The same kier and methods are employed as in the lime boil, but the material is either carbonate of sodium, the refined alkali of commerce alone, or a mixture of this with a small percentage of caustic soda, or as in the Mather and Walsh kier caustic soda and the resin soap. Bleachers and particularly printers use a soap formed by dissolving resin in the alkali. Bearing in mind that the

original fats are now in the state of the fatty acids uncombined. they are now in a condition to readily unite with the alkali to form a soluble soap. When the goods have been boiled the required time, from 12 to 24 hours, in a no pressure kier, and from 6 to 12 in a pressure kier, the cloth is removed from the kier, and after washing, is in the proper condition for the chemicing or clorineing, in other words, for the actual bleaching. In commerce is a substance commonly, but erroneously called chloride of lime, but more properly hypochlorite of calcium in combination with chloride of calcium with a greater or less per cent of impurities, such as chloride of calcium and hydrate of lime. The exact composition is slightly in doubt. It is manufactured largely abroad under the name of "bleach" and is formed by passing chlorine gas over hydrate of lime under the proper conditions, and is capable of forming clear weak solutions with water. The goods, by means of a machine similar to the one used for souring, are thoroughly saturated with the weak solution of the hypochlorite, squeezed and allowed to stand in piles from two to three hours until the cloth attains the proper degree of whiteness.

The theory of bleaching is something like this, the hypochlorite is very easily decomposed, and by being in contact with the vegetable matter and the carbonic acid of the air forms a powerful oxidizing agent and destroys the color in the cloth. It has been thought that nascent oxygen, that is oxygen just released from combination, is present and that this does the real bleaching. One thing is certainly apparent, namely: that the hypochlorite has a destroying affect on substance brought in contact with it, hence great judgment must be used by the operator to prevent possible damaging of the goods.

It may be interesting to touch here upon a matter known to every calico printer and some dyers, namely: the brown stains after steaming in printing and the darker shades sometimes apparent in dyeing plain shades. Much worry and anxiety has been caused by this trouble. These stains are due to oxycellulose, long continued action of the bleaching solution upon cotton cloth in the presence of air

will produce this compound; it need not necessarily show tender after the bleaching, but when the printed cloth is put into the steaming box for the purpose of developing the colors the cellulose becomes still further oxidized until disintegration is produced. Oxycellulose has a greater affinity for basic colors than ordinary untouched material and will dye darker wherever upon the cloth this compound may have been formed. The only remedy is not to allow the bleaching liquor to have too long a time in acting upon cloth, and above all, not to allow any part of the cloth to become dry.

After the bleaching, the goods are again soured in weak sulphuric acid, well washed to remove any trace of acid. All this time the goods have been, as it is called, "in the rope;" it is now necessary to open it out into its original width. This is accomplished by means of the machine represented upon the screen, although in some works it is still opened by hand. It is necessary in either case to have a long distance to draw the cloth so that the twist may have a chance to be opened out.

This machine consists of a beater to keep back the twist, while the opener opens the goods and delivers them to the mangle for squeezing and also to prepare the threads for finishing. We have here two forms of water mangles, three and five bowl, in front of each is an expander, as shown, whose duty it is to keep out the scrimps and double edges and prevent the cloth from being nipped in the machine, also to obtain an even squeeze.

The rolls are husk and iron. In the five bowl, there is an arrangement for chasing, that is, cloth being run through the nips upon itself and two cans to steam the fibre for subsequent finishing, the goods are then ready for drying and finishing, printing or dyeing.

We have now attempted to trace the chemical and mechanical processes of the bleaching of cotton. We have not touched upon the other fibres, but enough to say that the bleaching of vegetable fibres is similar, while wool or animal is usually bleached with the sulphurous process, a gas evolved from burning sulphur.

Let us now look at the magnitude of the business. There are

three concerns bleaching cloth in our own city. In all, probably 150 millions of yards. There are 1760 yards in a mile making about 85 thousand miles of cloth bleached per year by these concerns alone. When one considers that each yard must be inspected and answered for, some idea of the responsibility assumed is obtained. It is not enough that a perfect machine or apparatus be furnished, but the operations being based for their value upon chemical change, upon the hidden forces of nature it can readily be understood that good judgment must be constantly displayed in order to insure perfect success.

This art had its origin in most ancient times, but then it was simply a boiling or steeping and exposing on the grass to the rays of the sun and the dews of heaven, consuming weeks, months, while now under the impetus of the discovery of Berthollet in 1785, combining chlorine with potash, and later by the improvement suggested by Mr. Charles Tennant in 1789, namely: combining chlorine with the cheapest of all bases, lime, we are enabled to turn out in a short space of three days a fabric of dazzling whiteness.

SHODDY.

At a recent meeting of the Ancient Order of Serpents "Alec" Cuttle was initiated and immediately promoted to the rank of Second Lieutenant.

"Where's my rule?"

"Say, Mac, if you speed up the fan on the picker does it effect the draft of the machine?"

We respectfully suggest that their be a subway constructed between the studio and the corridor for the exclusive use of the ex, thus preventing the disquieting effect on the machine drawing classes during the ladies exit.

A three day's freshie "What the deuce is wrap perspiration."

In our next issue we will insert an artical just received, entitled "Hooker or Cams."

Where is that Mme of many dollars and no prices.—

THE WEB OF LIFE.

Warp and woof
For web of life,
Warp of peace
And woof of strife
Weave away the web of life
Rest and toil,
Meed and moil,
Make the motley web of life.

Shifts the thread
From black to white,
As the day
Succeeds the night:
That gives pain,
And this delight—
Mix the black up with the white.
Warp of peace
And woof of strife
Weave away the web of life.

Now the passions
Plunge and play,
Dive the treadles,
Dance the heddles,
Spins the shuttle
Clanks the lay,
While below,
To and fro,
Heavy swings the weights of woe.
Now awhile
In beauty blending,
Like the bow
From waves ascending,
Then again in fragments rending
And in blank confusion ending,
Bliss and bale
Weal and woe,
Through the warp commingling go,
Transient peace and lasting strife
Weave away the web of life.

Fortune flings
Her fitful thread,
Now 'tis black,
Or green or red,
Waving like an adder's head.
Here 'tis ravelled,
There 'tis knotted,
Now 'tis white,
And then 'tis spotted.
Silk and tow
Together rolled,
Thread of wire
Or thread of gold,
Through the various texture's told
Peace and plenty,
Want and strife,
Weave away the web of life.

Raven youth
And hoary age,
In their turns
The loom engage,
Rosy health
And pale disease
Come and go,
To pain or please,
Loss and gain,
Smiles and tears,
Blight and blessing,
Hopes and fears,
Tints of gladness,
Shades of sadness,
Mixing, mingling, on they go,
And nor pause nor lull they know,
Endless colors, ceaseless strife,
Weave away the web of life.

J. PASTOR.

LOWELL CARPET NOTES.

The condition of the carpet trade looks brighter for the future.

The Lowell Co. are running their Ingrain plant on full time. Ingrains selling well at a low price.

The Brussels and Wilton departments are running four days a week. It is hoped that this department will soon gain its old time activity.

The Astoria and Waldorf and Touraine Hotels, were recently carpeted with this fabric, the carpeting of these hotels receiving special mention. Fifty more Axminster looms are in process of construction for this company.

The story of "Will" Dodge, arrested at Bangor fors hooting a calf is denied by him. He shot at a calf and missed his mark, mistaking the calf for a deer. His guide informed him of his mistake and the calf's life was saved.

James Walker has applied for a patent on a double lifting design adjustment.

The New Lowell Arminsters have already become famous for their designs and colorings.

Colorists Silk and Quinn have just completed the Brussels and Wilton line, which reflects great credit on their ability. The line has been pronounced unusually good.

In the evening class of the Textile School are Messrs. Moir, Binns, Nugent and Stopherd of this company.

The boys from the Carpet carried off the honors at the Textile School last year. Messrs. Moir, Walker and Emmot stood at the head of the designing class, while Heaton, Binns took highest honors in weaving.

It does me good to see Johnnie Conway around the mill with his genial smiles. It looks as if Johnnie would not be with us long. He has an offer to appear at the new Nickeldoneon as the Human Tool Chest. Don't go, Johnnie, Mary isn't going.

BELIEVED IN A HEREAFTER.

Perique Paul.—"Does you know, pardner, dat I'd give me life fer a long, sociable smoke?"

Caustic Chumley.—Dats wot I'm afeared youse'll have ter do one er dese days." Judge.

OLD SAWS RESET.

A cold wind blows snow good.
A rolling pin gathers no dough.
A busted bellows blows no good.
A wise cork knoweth its own pop.
A wise cow knoweth its own fodder.
Flower by any other name would smell as wheat.
A boil in the kettle is worth two in the neck.
Sauce for the goose is sauce for the Michigander. Judge.

WANTS.

WANTED a position as overseer of finishing room. Had seven years' experience as second hand of a large finishing room.

Apply C C C, this office.

WANTED a position as an assistant designer in fancy dress goods mill, good references.

Apply J. H. Kennedy,
Hoystings address.

WANTED a young man with capital as a partner in an eight set worsted mill.

Apply this office.

TEXTILE STUDENTS TO GIVE DANCE

A few days before Christmas the students will give a dance in return for the great kindness show them by the ladies of Lowell who tendered the recent reception.

AN ANTIQUARIAN.

Topper.—They say he married her for her money.

Cropper (staring).—Um! Well I suppose that must be the rare old print that he told me was worth so much.

Nothing impedes a man's progress through life as to be so honest as to believe that the world regards him as such.

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SIXTH THOUSAND—Cloth, Crown, 8vo.

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Director of the Lowell Textile School.

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Lowell Textile Journal

COTTON CULTIVATION AND TRANSPORTATION.

By C. P. BROOKS,

Director of the Lowell Textile School, on December 16, 1897.

The lecture, which was in part as follows, was illustrated by about 40 lantern slides.

The cultivation of cotton was undoubtedly first pursued in India where cotton garments have been used for thousands of years, in fact ever since clothing was worn. In more civilized countries, cotton goods are comparatively a novelty, only having been manufactured in America and Europe about two centuries and a half. In the fourteenth century, there was a curious superstition regarding its mode of growth; this was nothing more or less than that the cotton wool was really the wool of lambs that lived and grew attached to branches of trees. Of course the only knowledge of fibrous substances possessed by our forefathers in those days was that of ordinary wool of the sheep and to some extent of flax, and no doubt they were unable to realize the existence of any other fibre than that of the wool of the sheep or hair of the goat. This belief was fostered, or more probably established by one Sir John Mandeville, described as a man of learning and substance, of the town of St. Albans in Herefordshire, who in the year 1322 left his native city and did not return for thirty-four years. In his report of his journey, he states that he travelled through all the then known kingdoms of the world. With regard to this vegetable lamb, I will relate his account in his words, or as nearly so as his quaint pharseology is intelligible. "Now shall I say you of countries and isles that be beyond the country that I have spoken of. Passing beyond Cathay and India and Bachary is a kingdom that men call Caldeya, that is a fair country and there groweth a manner of fruit as though it were gourds, and when they be ripe, men cut them in two and men find within a little beast in flesh and in bone and in blood as though it were a little lamb with wool outside it. Men eat both the fruit and the beast and that is a great marvel. Of that

fruit I have eaten, although it was wonderful, but I know that God is marvelous in all his works." Another account is by Baron Von Herberstein, an Ambassador to the Court of Maximilian. His account is that the seed when put in the earth grows a plant resembling a lamb and attaining to the height of 2 1-2 feet. It had head, eyes, ears and all other parts of the body of a newly born lamb. It had an exceedingly soft wool, which was used in the manufacture of head coverings. It was rooted by a stem to the middle of the body and devoured the surrounding herbage and grass and lived as long as that lasted; when there was no more within its reach, it died.

The real vegetable lamb is the cotton boll. Cotton is now the most widely manufactured of all fibres and is the fruit of a plant belonging to the order of the Malvacaae to which belong the mallow, the hollyhock and the okra. The cotton plant belongs to the genus Gossypium, and the number of species from a botanical point of view is variously stated from four to eighty-eight.

Discussing the life history of a cotton plant, we find that germination occurs rapidly and the first appearance of the plant above the ground is made from 4 to 14 days after sowing the seed. Two periods in the life of the plant may be distinguished. The first extends from the time of planting to the middle of the summer. This period is the time in which the plant makes its growth of stalk and foliage and gathers nourishment, which will later be stored up in the seed. During this period tropical conditions are favorable, namely moisture in the soil from frequent rather than from long continued rains, high temperature with small daily variation, plenty of sunshine, little wind, and a high relative humidity of the atmosphere to reduce evaporation to the minium. During this period everything possible is done to prevent loss of water from the soil; grass and weeds are scrupulously excluded and the surface of the soil is frequently stirred to conserve the moisture and increase the temperature. In the second period, from the middle of the summer to the time of picking, the temperature falls and the rainfall diminishes; this is the fruiting season of the cotton crop when every effort should be made to produce seed and lint rather than stalk and foliage. Every means is taken to dry up the soil, cultivation ceases and the soil is allowed to become hard and compact to favor evaporation of the moisture. Usually about 40 days after the plant shows above the ground there appears the first square or bud. From the formation of this bud 24 to 30 days

elapse before the appearance of the flower. The flower on the first day is a yellowish white and has five petals. One peculiarity of the cotton plant is in the change of color of the flower. This, which on the first day is of a yellow shade varying from a dull white to a canary color is found on the second day to be of a distinctly pink or reddish color. The flower drops on the third day. After the petals fall, there remains the small boll enveloped in the calyx, this developes until it becomes about the shape and size of a hen's egg, and 50 to 60 days from the appearance of the flower, it bursts. There is a popular superstition among the colored population that 27 days elapse from the bud or square to the flower, that the flower remains 3 days on the plant, and that 47 days more elapse, at the expiration of which period, the boll has burst and the cotton is ready for picking. While this may be accurate in many cases, the exact time varies with the season and with climatic conditions. When the boll bursts it exposes three to five cells divided by membraneous walls, and each of these cells contains seeds which previous to bursting of the boll were attached by filiments to the stem of the plant. The filaments ultimately disappear leaving the seeds loose in the cavity and covered with cotton, each seed is entirely enveloped by the cotton fibres which are attached to it, just as a human hair is attached to the head. The seeds vary in number from 32 to 36 in each pod or boll Several views were then thrown on the screen showing the development of the plant from germination to full size and also of the flower and boll.

The structure of the cotton fibre was then briefly spoken of and illustrated and a short description given of the cotton growing states and of the inhabitants, after which reference was made to the climate of the cotton belt as below:

The winter season is not cold as a rule, when snow falls it is only to the depth of an inch or two and rapidly clears away while the morning sun easily breaks up any frost that shows itself during the night. The air at mid-day in Christmas time is as balmy as a New England May day, spring is early and summer long, and it is this fact that admits of cotton raising. Cotton is a plant that requires an early start and long season to bring its fruit to maturity. In the South, it is not unusual to have hot weather beginning in April and May, lasting almost without intermission till September; June and July are usually extremely hot, and those who are able take to the mountains of Georgia, North and South Carolina.

Cotton flourishes best when the nights are warm as well as the days,

but this advantageous feature from a cotton raising point of view is of distinct disadvantage to the human race.

In the cultivation of cotton, the ground is broken up by deep cutting turn plows in winter or in the early spring. In some cases, it is

The next process is bedding up, and especially on new land the making of the first furrow or laying off furrow is a matter of some considerable importance. It may be that a special laying off furrow is made with a shovel plow to locate the beds, but more often the first

then fertilized by coarse manures applied broadcast and afterwards harrowed, but more commonly after the breaking of the ground, it is left for nature to operate on until nearly the time for sowing the seed. Before the latter can be done, the ground has to be laid off and bedded.

cut towards bedding up lays off the bed. Especially on an even ground, laying off is of such importance, as by a proper arrangement of the furrows to give good surface drainage, washouts during heavy rains are prevented. Where possible the water should drain to a branch (small stream).

The recognized and accepted mode of cultivating cotton throughout the South is in elevated ridges or beds, varying in distance apart according to the habit of the plant as the height and foliage. On rich bottom lands, where the plant attains the height of from 6 to 10 ft., as for example in the bottom lands of the Mississippi River, the furrows are usually 6 ft. apart, diminishing on poor land or more northern latitudes as in North Carolina, or Virginia to 2 1-2 ft. An average over the cotton belt would be about 4 ft. The next work is to form these beds. This is done by a one horse turning plow with a large cut, and the bed is formed by plowing along the field throwing the soil in one direction. Then by passing down the opposite side of the bed throwing the soil to meet the previous furrow; it may be that two plows are used, one taking each side of the bed and throwing up the soil to meet that thrown up by the plow preceding. By this means the compost of manure thrown broadcast is turned into the bed.

Manure is most frequently applied in the form of commercial fertilizers. The most approved plan is to fertilize by means of a machine, consisting of a hopper carrying the fertilizer suspended on a frame like that of a wheel barrow, and usually arranged with a moveable bottom to the hopper, alternately opened and closed by the revolutions of the wheel. This machine the more primitive method of fertilizing is by means of a fertilizer tube. This is a tin tube some 5 or 6 inches long with a funnel at the upper end. The field hand using this carries the fertilizer in a bag suspended from his or her waist or shoulder, and feeds the tube by hand through the funnel, the lower end of the tube resting in the place where it is desired to deposit the fertilizer. In a tract of country 500 miles by 1500 it will be recognized that there are many different methods of cultivation. What is given in this lecture may apply to some districts and not to others.

After the ground has been manured it is left until planting time. This varies according to the latitude of the district in question, but it may be accepted as occurring in April in the vast majority of districts. In some of the favorite districts of Mississippi, Louisiana and Texas where the season is obnormally long, seed is planted in the latter part of March. In the heart of the cotton belt, April 1st is accepted as a suitable date, in North and South Carolina and Tennessee, it is considered unwise to plant before the 15th of April, while in the extreme northern edge of the belt as in Virginia, planting

is deferred to the last days of April or early in May.

In moist, warm weather, the cotton germinates rapidly and on a large farm that first planted may appear above the ground before the last seed has been sown. Three days after planting is about the earliest recorded appearance of the seedling, and in dry or cold weather, it may get into as many weeks.

The average time of germination may be taken as seven days. The plants appear in a broken line, the spaces being caused by the non-germination of the seed, or the irregularity of planting. Still there are a great deal too many plants in a row, so many as to obstruct one another's growth and grow too thickly for cultivation or for the light and heat of the sun to develope the flowers and the fruit. The whole field has therefore to be thinned out. The thinning out is accomplished by killing the surplus plants by a cut from a hoe and thus a more expressive term often used is chopping out.

This is one of the two great expenses of cotton culture, the other being cotton picking. Chopping out requires the services of every one on the farm, man, woman and child, and often some hired help if it is to be had. All through the month of May the railroad traveller sees the field hands at work letting their heavy hoes drop apparantly carelessly, but really with great precision, cutting away a dozen plants for each three left standing, but always leaving the right one.

The distance left between the plants is a matter which depends on the soil and the usual growth of the plant. In the inclined lands of Texas, Mississipi, Louisiana as much as two feet, or exceptionally three feet are left between the plants, but the plants in those districts grow to the height of 6 or 8 feet. In all other sections of the same states and generally over the whole cotton belt 8 or 12 inches are left between plants on poor land and 12 to 15 inches on richer land.

The plant is allowed to make three or four leaves before thinning out, attaining a height of five or six inches.

An anxious and busy time now ensues for the up-to-date farmer. He is scared lest the first few nights of May should be cold. Cotton loves heat moist heat, this cannot be too strongly emphasized. Warm days and warm nights in May add a million bales to the crop, but warm days and cold nights, even though the thermometer does not fall to freezing point may so weaken the young plant that it is not wise to allow them to remain, and there is nothing for it but to plow them up and

replant. He is also scared lest he might have too much rain, causing the growth of grass in his field and weed on the plants, weed being used through the South to indicate superflous growth of stalk and leaves and tendency to run to weed, or that he may have too dry weather for his cotton to make proper progress encouraging dust and cotton worms. His time is all occupied in cultivating the land, which term, although applied generally to the whole series of operations of raising cotton is used more specifically for the operations between thinning out and cotton picking, the object of which is to keep the field free from vegetation, crab-grass, cow-vetch, rag-weed, cockle bur, morning-glory and such like vines.

It is the aim of all farmers to complete the cultivation by the end of June and then, to use their expression, "the crop is laid by." This period or rest usually occupies from a date in July, according to the season and afterwards as much of the month of August as elapses before the commencement of picking. It is the aim ot the farmer to begin to lay by his crops between the 1st and 4th of July when possible.

A cotton field in flower is not so attractive a scene as might be imagined; the flowers are not large, and are not even noticeable in the large mass of dark green foilage, which stretches in an almost unbroken sheet.

Picking in an average season commences from the 1st of August in some parts of Texas, to the last of August in the Northern states of the cotton belt.

Occasionally in an abnominally early season, such as in 1896, some cotton is picked in July. In the season named, the first bales of new crop cotton appeared in the market in July from several states, but this is of course very unusual, and picking is not usually commenced till August.

Before the farmer disposes of his cotton, or rather before he is willing to dispose of it, it has to be put in marketable shape in the form of a bale, and prior to baling has to be hauled to the gin house to be ginned. The seed cotton as it is picked contains two-thirds of its weight in seeds. Each boll contains 36 or 40 seeds, and the cotton is attached to these by one end of each fibre, just as a human hair is attached to the head. To remove the fibre from the seed, a gin is used in America generally ot the variety known as the saw gin, and after the lint has been removed, it is baled in baling presses.

The compress strikes the visitor to the South perhaps more than any other process in the raising of cotton, or its preparation for the

market. It is wonderful to see a bale which has been already partially pressed at a country hand press and may be 28 in. thick, placed between the huge jaws of this contrivance and condensed in bulk until it is only 8 in. thick. The agility and daring of the fourteen negroes who insert the bale, covers, ties, between the jaws of the huge press is very noticeable.

The lint for spinning purposes is by no means the only product of the cotton plant. Many large industrial concerns in the South are employed in the business of working up the cotton seed in different ways and among their products are:

Lintars. This is the name given to the short fibres or fud that clings to the seed after the long

The compress consists of a large steam cylinder which is 90 in. in diameter and worked at a pressure 120 lbs. to a sq. inch, and it carries at the lower end of the piston rod a wedged shape tooth rack which has geared with it cycloidal sectors, one at each side of the rack. Each of these sectors is very massive, weighing about 20,000 lbs., and each has 2 links or lifting rods to raise the platon or platform.

fibres have been removed in ginning. This short fibre remaining on the seed after the long fibres have been torn off in the saw gin is removed by special gins and either sold as linters for spinning purposes or made into batting (wadding).

Hulls. These are the outer casings of the seed and are split off preparatory to expressing the oil. Hulls are largely used as cattle feed.

Cotton Seed Oil. This is the most valuable bye product and is expressed from the meats which form the center of the seeds.

Oil Cake. After the oil has been expressed, the meats are left in the form of a cake, which is used either as cattle feed or as fertilizer.

Fertilizer. The cake is broken and ground, then used either alone or mixed with other substances as valuable fertilizer.

All of the above articles are produced in the larger oil mills, except batting, which is only made in a few mills. A ginning and oil refining business is generally conducted in addition. In the smaller oil mills usually only the business of ginning crude oil, pressing feed and fertilizer making is conducted.

The subject matter which has been treated by me in this lecture occupied my attention considerably a couple of years ago. I collected a quantity of information, and wrote it up suitably for publication in book form, but the work has been laid aside in consequence of more pressing duties during the last year.

COTTON OPENING AND PICKING MACHINERY

By CHARLES C. HEDRICK,

Principal of the Cotton Spinning Department of the Lowell Textile School.

The cotton spinning department of the Lowell Textile School is provided with a system of opening and picking machinery which is used in many of the cotton mills of the country. This consists of an automatic feeder, a single beater breaker picker, with a rigid beater, and a single beater finisher picker, with an evener and carding beater. The opener with the trunk system, which is generally used in the larger mills, is not needed where a small production is desired.

The cotton, after it has been opened by hand, is fed directly into the hopper of the automatic feeder, which is connected directly to the breaker, as is shown in the section of the automatic feeder and breaker picker, shown on sheet number one.

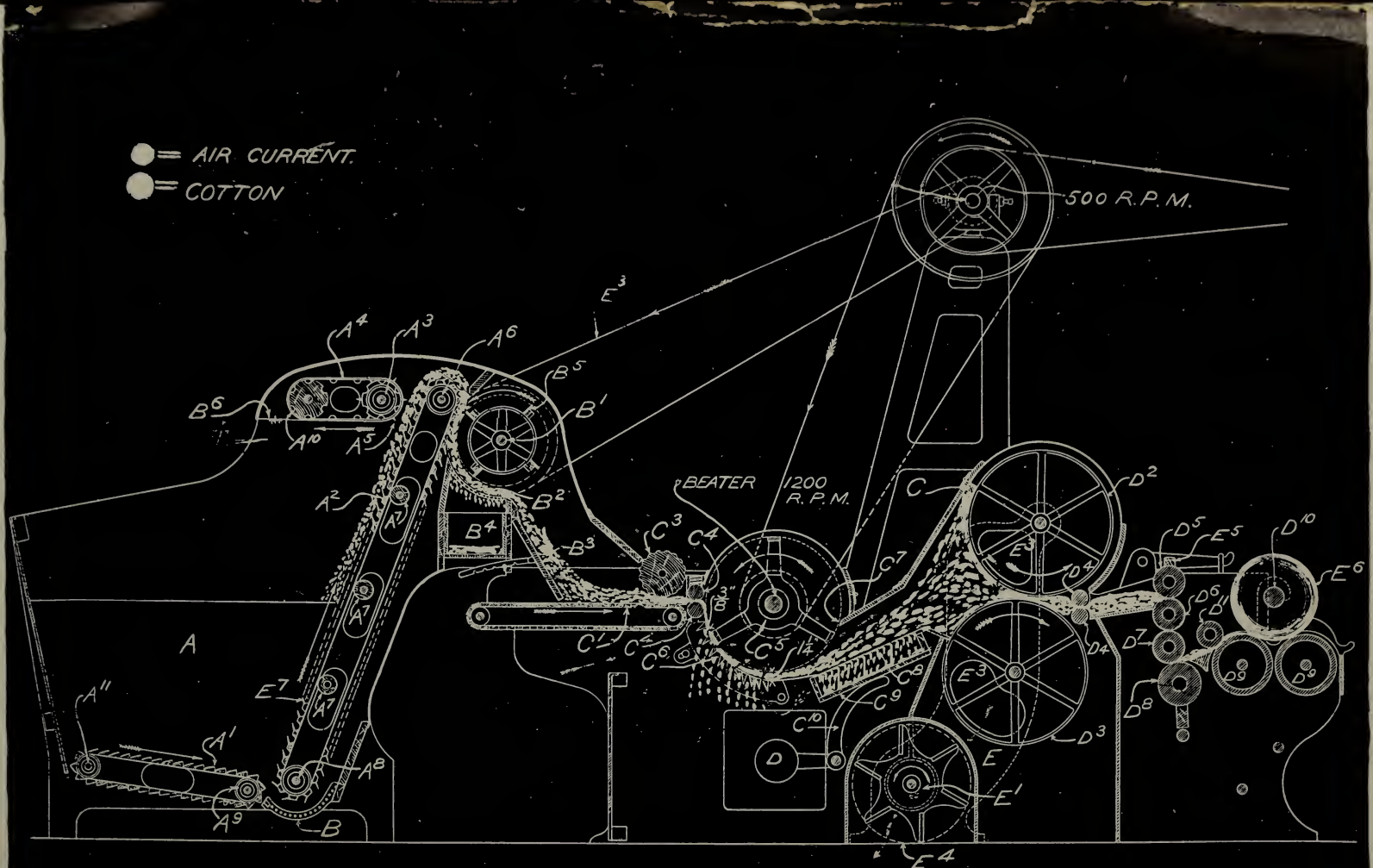
THE AUTOMATIC FEEDER

serves to a great extent as an opener, by reason of the cotton being tumbled about in the hopper, before it is carried up on the elevating apron, and in order that the cotton shall be delivered to the breaker as evenly as possible the hopper, A, is kept about two-thirds full. The

bottom of the hopper is formed by a horizontal apron, A^1, called the bottom apron, by which the cotton is carried forward against the elevating apron, A^2, the bottom apron being driven by the roll, A^9, while, A^{11} serves as a carrier for its outer end. The elevating apron, which runs in an almost vertical position, consists of a heavy canvas belt, backed with leather strips, fastened to which are wooden slats. Projecting from these slats are pins, E^7, by which the cotton is caught and carried upwards. This apron is driven by frictional contact with the roll, A^6, the roll, A^8, serves as a carried for its lower end while the rolls A^7, as supports to prevent the apron from sagging. At the top of this apron is situated the spike roll, A^3. This roll is about six inches in diameter and has pins or spikes, A^5, projecting about three-fourths of an inch from its surface. The object of this roll is to strike off any surplus bunches of cotton which cling to the elevating apron, and to regulate the amount of cotton that is carried foward to the breaker. Around the spike roll runs an endless leather apron, A^4, called the spike roll apron, which has slats in it, through which project the pins of the spike roll. Any cotton that is disposed to collect on the pins, is readily stripped off by this belt.

The amount of cotton which is delivered to the breaker is regulated by the position of the spike roll which is adjustable, horizontally, thus the greater the space between it and the elevating apron the more cotton is allowed to pass by. In order that the spike roll shall stand parallel with the elevating apron, and that the roll shall be moved parallel with it, when changing its position, indexes are located at B^6, on the outside of either side of the hopper by which the exact position may be noted. Between the lower end of the elevating apron and the end of the bottom apron is a space of about one and one-half inches which allows dirt and other foreign substances to fall through into the hopper screen, B. This screen can be dropped and the dirt removed when necessary.

The cotton which is left upon the pins of the elevating apron, after it has passed the spike roll, is next acted upon by the doffer, B. This doffer, which is driven from the countershaft of the breaker, by the belt, E^8, is about fifteen inches in diameter and has extending across its whole face, four wooden blades, B^5, faced with leather, which are slightly in contact with the pins of the elevating apron, and as the doffer runs about 160 revolutions per minute a continuous series of blows is given by which the cotton is stripped or beaten from the pins and thrown



SECTION OF AUTOMATIC FEEDER AND BREAKER PICKER.

SHEET NO. 1.

against a screen or grid, B^2, called the doffer screen, through which any loose dirt will fall. Beneath the doffer screen is a dust drawer, B^4, which receives the dust and dirt that is beaten out by the doffer. From the doffer screen the cotton passes down an incline, B^3, on to the feed apron of the breaker, C^1, being assisted by the current of air produced by the doffer.

BREAKER PICKER.

The cotton is now carried forward by the feed apron, passing under the press roll, C^3, to the feed rolls, C^4. The press roll condenses the cotton, that it may be readily drawn between the feed rolls, which being small in diameter could not receive it in a loose form. After passing the feed rolls the cotton is acted upon by the blades of the rigid beater, C^5. This beater consists of three steel blades running across the width of the machine, which are securely riveted to four or five sets of arms or spiders which are fastened to the beater shaft. These blades are slightly beveled on each edge, but not enough to cut the cotton, and as the blades become dulled by constant use the beater is reversed in its bearings and the other beveled edges brought into use, both ends of the beater shaft being made alike for this purpose.

The beater runs about 1200 revolutions per minute. Therefor each inch of cotton delivered by the feed rolls receives a great many blows, by which it is opened, cleaned, and removed from the feed rolls in small tufts, which are thrown with considerable force against the beater grid, C^6. Thus the dirt, seed and heavy impurities, which are struck down with the cotton, fall between the bars into the space below, while the cotton, which is very light, is prevented from passing through with the dirt, by the draught of air which is produced by the fan, E^1, and which enters from the space below passing up between the bars.

It will now be seen that a double operation is going on, the cotton is being drawn along by the air draught, while the heavy impurities are being driven through the grid against the air draught. The speed of the fan, which is about 1060 revolutions per minute, plays an important part in separating the dirt from the cotton. If the draught is not strong enough, the cotton will be driven down through the grid with the dirt, making too much waste; while if the draught is too strong, the dirt will be drawn along with the cotton into the lap.

The beater grid consists of a series of stationary bars which extend from side to side, and around the beater for about a quarter of a revolution. The first bar, under

the bottom feed roll is set about three-eights of an inch from the circle described by the beater blade, while the last bar is set about one and one-fourth inches away. The grid bars are supported by brackets, which are adjustable and are bolted to the frame. The space between these bars is graduated, those nearest the feed roll having the widest space between them, as the greater part of the dirt is removed before the cotton passes to the last of the series.

In setting the feed rolls, care should be taken that they are not set too close to the beater, as the fibres would become broken by reason of their not being free from influence of the bite of the rolls. If too much space is left, the cotton is apt to be curly and stringy. A source of trouble which sometimes presents itself is that the cotton collects on the beater blades particularly when the cotton is dusty or damp.

The cotton is now under the influence of the fan draught by which it is drawn forward over the inclined grate bars, C^8, and under the cut-off or stripping plate, C^7, and is collected upon the slowly revolving cages, D^2 and D^3. The strip, C prevents it from pushing above this point. The dust and dirt, which is shaken out of the cotton, settles down between the grate bars into the box, C^9, a dead air space is formed by every fourth bar extending to the bottom of the box, thus preventing the dirt from being drawn back into the cotton. The bottom of the box is kept up in position by the lever C^{10}, and the weight, D. When it is necessary to clean out the box the weight is raised allowing the bottom, which is hinged at one side, to swing down.

The stripping plate, C^7, by reason of being set close to the beater prevents the cotton from following around with the air draught.

The air draught passes out at the ends of the cages through the openings, E^3 (represented by dotted lines) to the fan. From this point the air is forced out through the opening, E^4, into the dust room. The cages thus form a screen, which assists in cleaning the cotton, the fine particles of dust and lint passing through with the air draught. The openings, E^3, can be closed by dampers, when it is necessary to throw the draught all on one side of the cages as the lap sometimes becomes thin on one edge. The openings, or meshes, in the top cage are generally made larger than those in the bottom cage, this allowing a greater passage of air through the top cage, consequently a thicker sheet of cotton will be formed. If the cotton is deposited equally on each cage, although formed into one

sheet by passing between, there is a tendency to separate or split, when unrolled behind the finisher, picker or card, but as the sheet from the top cage forms the inside face of the lap, this trouble is overcome in a measure. The cotton is now carried around and stripped off of the cages by the stripping rolls, D^4. Then it is drawn between the calender rolls, D^5, D^6, D^7, and D^8, which are heavily weighted and being slightly different in diameter, the faces of the lap are smoothed or ironed out, which also tends to prevent the laps from splitting. After leaving the calender rolls the cotton passes forward under the press roll, D^{11}, and is wound on the lap roll, D^{10}. This lap roll is held down by friction, and rests upon two fluted rolls, D^9, called lap calender rolls, which revolve and cause the lap roll to wind on the sheet of cotton, as it comes from the calender rolls. The lap is thus wound very compactly and firmly.

AUTOMATIC SAFETY STOP.

It is necessary that the laps, particularly from the finisher picker, should be as free as possible from any foreign substances, such as nails, pieces of hoop iron, etc., which, if they by accident should become wound into the lap would cause considerable injury when fed into the card. The device to prevent this is called the automatic safety stop, two views of which are shown on sheet number two.

The calender rolls, cages and feed rolls are all driven by the pinion, H, through the gear, H^{10}, thus by disengaging these gears the calender rolls and parts connected are stopped. This is accomplished in the following manner: The cotton after leaving the cages passes between the top and second calender rolls, D^5 and D^6, respectively. These rolls, which are heavily weighted, are connected to the weight by the top lever, F, the rod, F^1, and the weight lever, F^2, upon which is the weight, F^5. Directly above this weight lever is the knock-off lever, F^3, which turns on the shaft, F^{10}, and has a screw, F^4, near its inner end, by which it is adjusted. When it is in its normal position, its outer end is just clear of the under side of the knock-off latch, F^6. This latch, which turns on the stud, F^7, has a notch in its upper end, by which the drop lever, F^8, that carries the pinion, H, is held in position. Should any foreign substance be drawn between the calender rolls the unusual thickness of the lap caused by this substance, would lift the top calender roll, and through the connection previously described, the knock-off latch would be moved to one side, allowing the drop lever to fall, disengaging the

gears, H and H^{10}, and stopping the calender rolls.

MEASURING DEVICE.

In order to get the best results, the laps should be as near the same weight as possible, not that each square yard of lap shall weigh the same, but that the total weight of each lap must be within the limit of one-half pound variation from the weight of a forty pound lap. The weight of the lap is governed by the number of yards that it contains, this being measured by the revolutions of the lap calender roll, the picker being automatically stopped after the required number of yards has been wound. The device by which this is regulated is called the knock-off, a diagram of the gearing being shown on sheet number two.

The knock-off or change gear, K, is driven from the calender roll side shaft; loose upon the hub of this gear is a dog, H^7, which is driven by a pin, H^6, forming part of the gear; as the latter turns, the dog is brought against the upper end of the knock-off latch, F^6, moving it out and allowing the drop lever, F^8, to fall, disengaging the pinion, H, and the gear, H^{10}, and as the dog assumes a vertical position, by reason of being loose on the hub of the gear, the picker can be started immediately after it has knocked-off. The knock-off gear makes one revolution for each lap wound, thus a change in the number of teeth it contains, gives a different number of yards in the lap.

When the weight per yard and the total weight of the lap have been established, the constant number or factor by which the number of teeth in the knock-off gear is calculated may be figured.

The lap calender rolls are 9 inches in diameter or 28.27 inches in circumference, therefore 1.27 revolutions would be required to wind one yard or $\frac{36}{28.27}$=1.27 revolution.

Starting with the knock-off gear, by setting down the train of gears in their regular order, leaving out intermediates and the knock-off, we can obtain the factor. Thus,

$$\frac{\text{Knock-off gear} - x \times 35 \times 80 \times 14 \times 18}{18 \times 1 \times 13 \times 73 \times 37 \times 127 \text{ revs.}} = \frac{705600}{802683.18} = .879 \text{ factor.}$$

Rule,

Factor x teeth in knock-off gear=yards in lap

or

$$\frac{\text{Yards in lap}}{\text{Factor}} = \text{Teeth in knock-off gear.}$$

Example:

What is the length of a lap with a knock-off gear of 30 teeth?

$$.879 \times 30 = 26.37 \text{ yards.}$$

or

What gear would be required to wind a lap 48 yds. long?

$$\frac{48}{.879} = 50.06 \text{ teeth in knock-off gear.}$$

As a proof of the above example we will substitute a gear of 30 teeth for x in the formula for figuring the constant number, we then can obtain the correct number of yards. Thus,

$$\frac{30 \times 35 \times 80 \times 14 \times 18}{18 \times 1 \times 13 \times 73 \times 37 \times 1.27 \text{ revs.}} = \frac{21168000}{802683.18} = 26.37 \text{ yards.}$$

(To be continued.)

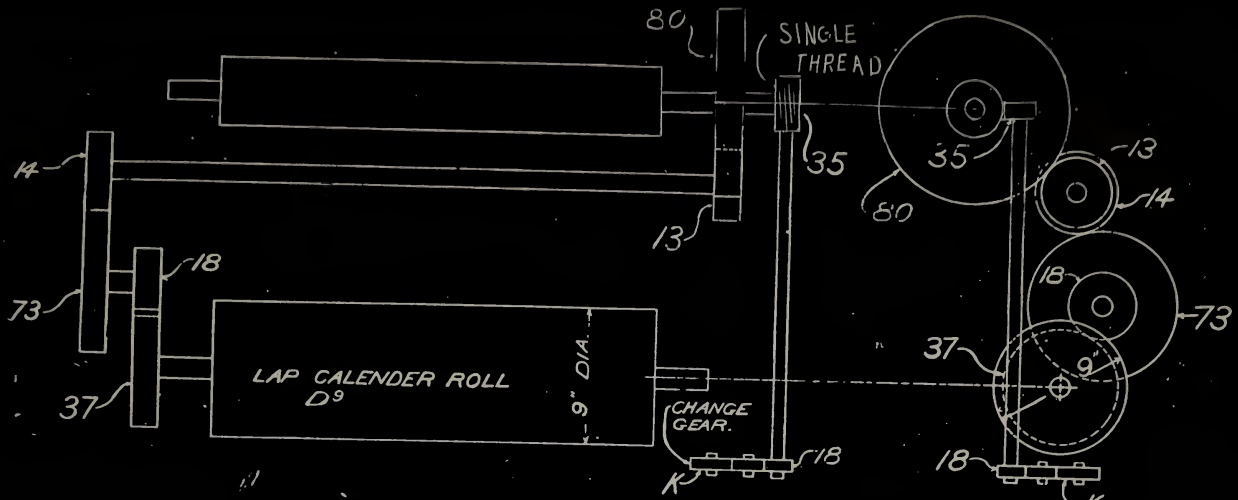
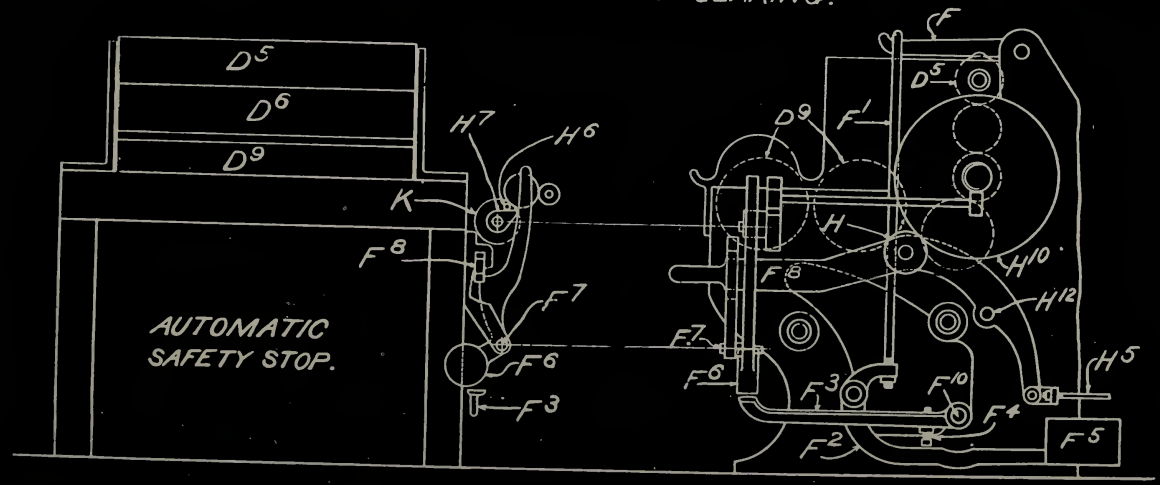


DIAGRAM OF KNOCK-OFF GEARING.



BREAKER AND FINISHER PICKER.

SHEET NO. 2.

THE LOWELL TEXTILE JOURNAL,

PUBLISHED MONTHLY

—AT—

No. 67 Middle Street, - Lowell, Mass.

—BY—

THE LOWELL TEXTILE JOURNAL COMPANY.

W. M. HASTINGS, Editor.

A. B. FELS, Treasurer.

Entered at the Post Office at Lowell as Second Class Mail Matter.

SUBSCRIPTION TERMS;

For one year postage prepaid - - - -	$1.00
Single Copies " " - - - -	.10
For Sale at all Newsdealers - - - - -	.10

Advertisements must be at the Journal Office before the twenty-fifth of each month for insertion that month.

Contributions may be sent to Editor of The Lowell Textile Journal and will receive prompt attention.

PRINTED AND BOUND BY M. G. WIGHT & CO., LOWELL.

EDITORIAL.

The general outlook to-day in the cotton goods market which seems to be due more to the lower wage scale in our own South and other countries than to any other cause, is by no means bright. The necessity of finding an outlet for the surplus production resulting in part from this is more urgent than for some time past.

As the reduction of prices will doubtless dispose of these goods, the mills of Fall River will continue to run unless there be some difficulty in obtaining from the operatives the acceptance of the reduction of wages.

This latter consideration can hardly be seriously entertained, however, for in the event of an enforced idleness the manufacturer would be on a much better footing at the end of a few weeks to withhold the demands of operatives than he is to-day, inasmuch as the problem of an over-stocked market would have solved itself.

. . .

The periods of quiet in the market, generally noticeable before the holidays and at the close of the year do not seem to have been in evidence in '97 as in previous years.

A marked increase in trade is shown over last year. Although this may not be true of cotton goods, the prices on wool are fairly firm and with some slight movement in the market. The demand for iron and steel has increased, and the prices on wheat and other cereals show steadiness.

The general outlook throughout the country is good, the increase seemingly well distributed over the United States.

. . .

The avidity with which some of our Eastern and Southern men have grasped the idea of establishing Textile Schools in ther respective cities would be greatly lessened if they could but know the difficulties in the way of starting institutions of this character.

One of the first things to learn is that the work is not entirely ac-

complished when the appropriations have been secured. This is a hard task. The obtaining of these funds, although in itself difficult is only the initial step, but paves the way to a tangible start.

The selection of the equipment should be looked after by thoroughly competent men, as the machinery is a most important factor. Too much can not be said on this subject. Obsolete and antiquated tools are ever detrimental, and in a school which should be up to date, are fatal in their effects. This latter fact should never be lost sight of in any technical school and is particularly true of the one under consideration.

A board of trustees will some times say of a certain machine, "What if this has been running fifteen years? It is still doing satisfactory work. Why should we increase our expenses to get a new one?"

The fact that it is still doing "satisfactory work" is not the point. The question to be asked is this, "Should not the improvements on this machine which save labor and stock, be known and utilized by the students in our charge?"

The Lowell Textile School has started with this latter spirit and for this reason will continue to be considered the finest equipped school of its class in the world.

The matter of finding suitable instructors is by no means an easy one, though scarcely to be considered here.

These are but a few of the multitude of questions that confront a school board and which must be answered with good judgment and despatch.

AGAINST PRIDE IN CLOTHES.

"How proud we are! how fond to shew
Our clothes, and call them rich and new,
When the poor sheep and silkworm wore
The very clothing long before!"

"YOUSE a bird, yo' is, Sam Johnsing! I'se a good mind to eat yo' heart!"

"G'way, Chile, yo' can't mak' ma heart quail!"—*Life.*

THE latest story from Klondike is that a man was caught out in a windstorm. The ground was dry and dusty. When the man got home he coughed up $73.15 in gold dust.—*Salida Mail.*

"I ASKED the young woman in front of me to remove her big hat so I could see the stage."

"Did she do it?"

"No; she said if she held her hat in her lap she couldn't see the stage herself."—*Chicago Record.*

TEXTILE ORNAMENTATION

By FENWICK UMPLEBY,

Headmaster of Woolen, Worsted, and Designing Departments of Lowell Textile School, Lowell, Mass.

III.

From the epoch that expired with the Roman Empire, to the period which commences with mediaeval times, there appeared to have been six or seven centuries of a weary and toilsome preparation, everything in a mixed and confused state. The world was, as it were, a vast chaos, and those forces which were destined to form a new civilization were at work in one confused mass, without any form or order. During the time of the Vandals, when they were masters of Africa, the Succi of Spain, the Ostrogoths of Italy, and even up to the time of Charles VIII, the people are considered to have lived in an age that was dark through ignorance, and barbarous through poverty and want of refinement.

Dr. Hallam, speaking of these dark times, says:—"At these times internal trade was hardly preferable to agriculture." There is scarcely a vestige to be discovered for several centuries of any considerable manufacture. Rich men kept domestic artisans among their servants, and kings in the ninth century had their cloths spun, woven, and made by the women upon their farms, but the peasantry must have had theirs supplied by purchase, therefore we must conclude that each town or state had its manufacturer and weaver. During this period Venice was at the head of commerce, and Amalfi held the second position. The trade in cloth appears to have been illicit, as we read in a passage in Luitprand's relation of his embassy from the Emperor Otha to Nicephorous Phocos, that the Greeks, making a display of their dress, were told by him that "In Lombardy the common people wore as good clothes as they." "How," they said, "can you procure them?" "Through the Venetian and Amalfitan dealers," he replied, "who gain their subsistance by selling them to us." The foolish Greeks were very angry, and declared that any dealer presuming to export their fine cloths should be imprisoned and flogged. Schmidt tells us of a manufactory in the ninth century, of which he says, "cloths were manufactured and exported from Friesland to England, and other parts, in the same century." Gregory of Tours, says, "Even in these unsettled times, the pilgrimages to the east redounded

to the advancement of the industrious arts," and on the evidence of these devout pilgrims, returning from the Holy land, he speaks of cotton, which he describes as "a wool which is spun like that of sheep, and of which garments are manufactured" In another place, Gregory of Tours seems quite delighted with the discovery of the cotton plant, which, he says, "is a tree, the fruit resembling small gourds, and is covered with a somewhat rough skin, that serves to protect the down contained in it, and when I was at last enabled to see and handle it, it was not without admiring its extreme whiteness and delicacy." From these extracts we may be assured that artistic life was nearly extinguished for some nine centuries, and it would be a very difficult task to describe the condition to whicn the people were reduced, who formed an integral part of the Roman system, and fell with its destruction.

But although the people were in a miserable state, we must not receive too liberally the gloomy descriptions that Demegot, Pope Agatho, Gregory of Tours, and other contemporary writers have left us of that sad period, especially that which concerns the present subject. We will admit that the invasions of the barbarians, the political and religious troubles, had a great deal to do with the lack of energy in, and the decay of, the fine arts, but we must also admit that, with all these disturbances, artistic life was not entirely extinguished. The fine arts were cultivated not only in Italy, but also in Gaul, even after the Franks had established themselves there, and whatever was the issue of battles, whether victory favored the Cæsars or barbarians, industry, in some form, must necessarily have been called into requisition, as is proved by the extract, from Gregory of Tours, when describing the re-discovery of the cotton plant. At a very remote epoch, we read of the Indians knowing how to manipulate this cotton, which they called Talla, and from which they produced the most varied articles. A Chinese writer, who flourished in the sixth century, refers to the exquisite muslins, embroidered with gold and silver, which were manufactured in the principal cities of India, and his pratriotic spirit takes fire at the sight of the noble daughters of the lettered class, preferring for a moment these foreign materials to the queenly and brilliant silken fabrics of his native land. Referring to Dr. Birdwood's work on Indian Arts, we read of many wonderful specimens of workmanship in cotton, linen and other raw materials.

In the time of Jedangir, Decca muslin could be manufactured so

light and gauzy that a piece of fifteen yards long and one yard broad, weighed only nine hundred grains, the price of which was forty pounds. The three pieces presented to the Prince of Wales, which were made expressly for him, were twenty yards long and one broad, and weighed 1,680 grains, or three and a half ounces each. Favernier states that the ambassador of Thah Tafy (A. D. 1628, 1651) on his return from India, presented his master with a cocoanut set with jewels, containing a turban thirty yards long, so exquisitely fine that it could scarcely be felt by the touch. In the handbook of the Kensington Museum, we read of muslin, which, when laid wet on the grass, became invisible, and, because it became indistinguishable from the evening dew, it was named "subhnam", i.e., the dew of evening.

Terry, in his voyage to the East Indies, 1655, says: "The natives of this monarchy are the best apes for imitation in the world, so full of ingenuity that they make any new thing to pattern, how hard soever it seems to be. It therefore is no marvel if the natives there make shoes, boots, cloths, and linen of our English fashion which are all of them very much different from their fashion and habit." Terry also tells us "that they," likewise, "make excellent carpets of cotton-wool in fine mingled colors, so artifically mixed that they represent those flowers and figures, made in them." Nearchus producing proofs of their skill in works of art and imitation says: "That when they saw sponges in use among the Macedonians, they imitated them by sewing hairs, thin threads and strings inextricably through flocks of wool, and after the wool was well felted together, drew out the hair, thread and strings when a perfect sponge remained, which was dyed to imitate the original."

Dr. Rock, in his "Textile Fabrics," has much to say on Indian cotton and linen. He tells us, "When Alexander wished to give some ambassadors a splendid reception he had a grand display of golden couches upon which to lie to eat their meat. They were screened with cloths of gold and purple, and the Indian guests themselves were not less gorgeously clothed in their national costume, for they came wearing linen garments equally resplendent." The passion for finery, the love for brilliant and extravagant dress which distinguished the inhabitants of the maritime cities of Venice, Calabria, and Campania arose out of the fall of the western empire, but the Romans, when withdrawing from these countries, did not carry with them that love for rich fabrics

which characterized the people they were leaving. And we know that the Iberians wore coarse and dark colored woollen garments, whilst, on the other hand, the Gauls were at the same time remarkable for their brilliant costumes, which were at times ornamented and enriched with precious stones, embroidered in gold and silver and of many bright colors. This display of finery required to be constantly ministered to, so the native looms were set up in rivalry to those of Greece and Rome, and they resisted for some time the rude shocks of successive inroads, which were made upon them, but were at last driven to take shelter in the cloisters of the religious monasteries. Thence it was in these hallowed places that was mainly fostered the practice and art of ornamenting textile fabrics, which ornamentation was carried to a very high degree of perfection. From this time these retreats gradually became centres of active industrial life. Trades, businesses and handicrafts of all descriptions were now clerical pursuits, and were practised under the shadow of the church by wealthy and powerful associations. There was a feeling alive in the middle ages that the best of all things should be devoted and given to the church. Knowing these facts, we do not wonder that ecclesiastical buildings possess so very many valuable relics of artistic textiles, nor yet are we surprised at the holy pontiffs, bishops, priests and abbots encouraging the manufacture of ornamental fabrics, especially those materials which were to enchance the pomp of religious worship. Hence we have those marvelous capes, still so jealously preserved in our churches and cathedrals, which astonish us even now, in our advanced age, by the finished workmanship which almost defies imitation. We read of the reliquaries adorned with gold and jewels, made by Saint Eloi, to be placed on the shrines of the saints, which shrines were usually covered with a silk veil, mostly woven in the precincts of the cloisters. At that time these veils were always embellished with costly embroidery and were much used in sacred edifices. Gregory of Tours often mentions these wonderful fabrics, while other writers give long descriptions of the tapestries of divers sorts which were hung on the walls of churches, some entirely of silk, others ornamented with pictorial representations. Costly raiment, handsomely decorated with the most skilful and ingenious designs, has been in use in the church from the very earliest times.

From the document published by the order of Master of the Rolls, we learn that the vestments of Evesham Abbey were of silk, and

that silk has played a most conspicuous part in the vestments of all pious and fervent worshippers from time immemorial. The best copes, chasubles, and vestments in St. Paul's, London, were made of silk; so were the gorgeous chasubles bequeathed to Durham Cathedral, the chief of which was red samit (silk) superbly embroidered. The genuine monuments of Christian Art which we read of being placed in the catacombs of Rome (subteraneous excavations which were used for the burial of the dead, and as places of Christian worship), include many precious relics of antiquity—paintings, works of art, and frescoes, illustrating scenes from holy writ; these sacred monuments have been seen, admired and glorified by the frequent pilgrims to that eternal city, who, on their return to their native homes, applied and followed the arts and examples of their predecessors, in adorning the sacred vestments and fabrics of their churches.

Still this extravagant and sumptuous display of richly ornamented fabrics, for the use of holy worship, did not meet with the approval of all the holy Pontiffs, in fact, it was deplored by some of the most austere savants of the church. We read that Saint Caesarius, also Bishop of Aries, in the sixth century, forbade, especially in the nunneries, the use of fancy ornaments embroidered in silk or in bombycine, and he hurls fearful anathemas against such stray sheep as would not yield to his orders. In the Council of Cloveshoo, in the seventh century, the nuns were advised "to spend more of their time in reading and singing of the Psalms rather than in knitting and weaving of vainglorious garments of many colors." Notwithstanding the zeal of some of the fathers and priests to try and bring the limit of ornamentation within the boundary of economical and virtuous display, some of the most gorgeous fabrics and the richest tapestries

continued to be sold, and even manufactured, under the very shadow of the church they were intended to decorate. With all these ecclesiastical ornaments, the brilliancy of which was heightened by gold and silver, at times by sparkling gems and precious stones, we cannot wonder at the taste for magnificent costumes, fabrics and tapestries, being fostered and spread abroad; but the very churches and cloisters that had nursed the art of manufacturing, and the sacred retreats that had thus fostered the gorgeous display, soon became unsuitable places for further patronage in proportion as the great and noble of the land began to have recourse to rich apparel. Gorgeous materials were in demand for every kind of enjoyment, at home and abroad; they were not only used for decorations on the walls of sacred edifices and appartments, but also for the tents of kings, feudatory lords, for war, for chase, and for the tournament.

The Reverend Daniel Rock, D. D., tells us of many worldly displays in which rich garments had a foremost part. We read of the streets of London (in the time of Elizabeth), "being cleanly dressed and besene with clothes of tappestrage, and some streets, as Cheepeside, hanged with rich clothes of gold, velvets, and silks." Extravagent and costly fabrics have been used in England, and in all foreign countries alike, in providing richly ornamented palls with which to cover the biers of the dead, more especially for those of the members of the various guilds, and D. K. Rock gives us an account of the obsequies of Henry the Seventh, in Westminister Abbey—a copy of which I give. "Two herands came to the Duke of Buckinham and to the Earles, and conveyed them into revestre, where they did receive certen palles, which everie one of them did bringe solemly betwene theire hands, and cominge in order one before another as they were in

degree into the said herse, they kissed theire said palle and delivered them unto their said herandes, which laide them uppon the King's corps, in this manner; the palle which was first offered by the Duke of Buckingham, was laide on lengthe on the said corps, and the residewe were laid acrosse, as thick as they might lie."

TALKS WITH BEGINNERS IN DESIGNING.

II

Many simple weaves and a great many complicated ones can be used in such way as to make cloths of different appearance. One of the most common methods is termed twilling to right or left. The four harness chaloon twill (A. Fig. 1) is a right twill, and to form that into a left, we place the first thread on the designing paper in the ordinary way, but leaving space on the left side sufficient for the weave. The second thread is now marked on the left side of the first instead of on the right, the third on the left of the second, and the fourth thread on the left side of the third. Fig. 1 B. This gives us, in this case, two fabrics with diagonal lines, from one weave. Some large weaves which will be given later can be treated in this simple manner and combined to advantage.

Fig. 1.

In making up a design composed of several weaves care should be taken to have those weaves join perfectly so far as is possible. For instance, in combining the three harness warp flush twill with the three harness filling flush twill, the black

squares of one should be placed exactly beside the white squares of the other as in Fig. 2. Frequently it is impossible to affect this as in the case of the first weave mentioned and the plain or cotton weave. The four harness twill and the basket weave A Fig. 3 "cut" or join perfectly. This joining of weaves is very important in making good cloths. This left twill cuts of course with the right of the same weave as well as with the basket.

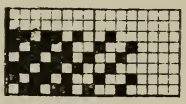


Fig. 2.

A Fig. 3.

Another set of weaves in common use to-day is known as the sateen twill, the first of which is here given :—Fig. 4. These weaves begin with the five harness twill, this being the smallest number of harnesses in the true sateen. These are always either warp or filling flush weaves, and although used to a great extent in designing figured table linen they are also employed largely in making unornamented cloth.

Fig. 4.

When the student has made several color effects and can place several weaves together in well-balanced combination he should be shown the exact way of utilizing the design in making fabrics.

Every dobby loom is limited to a certain number of harnesses ; the structure of the loom admitting generally less than twenty-four. Thousands of looms built for the cotton trade every year and made for producing a special cloth will not operate a quarter of that number. The loom we will consider, however, will hold as many as twenty-four. Now if we have a design of 40 threads by 36 picks,

that is, one that will repeat on 40 threads and 36 picks, it will be observed that 36 harnesses will be required to lift and depress those warp threads 40 times in order to allow the full design to be woven, unless we can devise some means to reduce this figure to a smaller number without changing the finished cloth. Such a scheme has been devised and is termed *drafting*. For convenience we have a smaller design, 32 threads by 32 picks, as in Fig. 5 A. What we wish to do first is to get all the different threads in consecutive order by themselves to form a chain draft, omitting duplicate threads. The first four threads in this design are all different and therefore form the first four threads in the draft B. Now beneath the first four threads in A and well below, we place the number of each thread on the same space on which it is marked and also on its own harness as

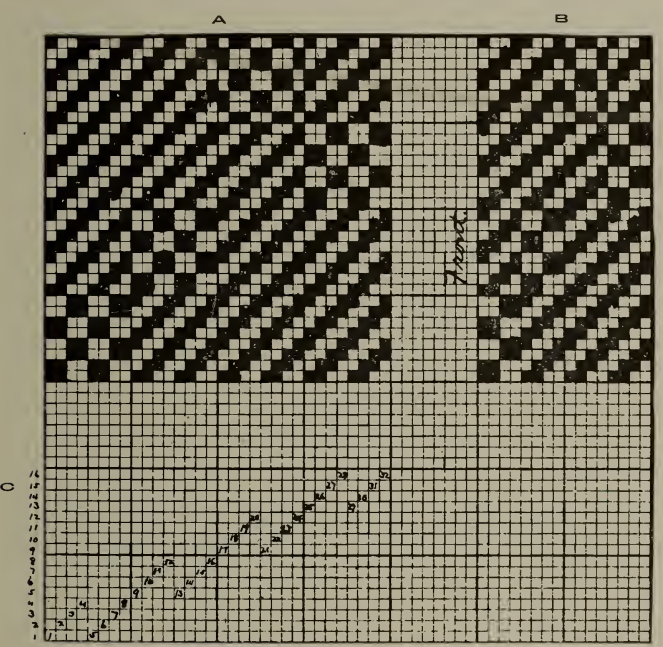


Fig. 5.

in C. The bottom space across the paper in C, and which is marked on the left side 1, represents the first harness. On this harness it will be observed is placed No. 1 thread. The second thread is placed on the second harness, the third thread on the third harness and the fourth thread on the fourth harness. The fifth thread in A is like the first, the dots in the design being in the same relative positions. We do not add this to B as we already have a thread like it, but in C place this fifth thread on the first harness. The reason for this is obvious, for the first and fifth threads being alike one harness will lift them both. The sixth, seventh, and eighth threads are like the second, third and fourth and are therefore not marked on the chain draft but are placed on the second, third and fourth harnesses in C. The next four threads, nine, ten, eleven, and twelve are not like any preceding ones and therefore are marked on B to form the next part of the chain draft. These last four threads being unlike any previously considered occupy the next four harnesses in C. The four threads following, thirteen, fourteen, fifteen, and sixteen are like the last four and while occuping the same harnesses in C, are not placed in B. We have thus disposed of sixteen threads of the design and occupied only half that number of harnesses. The next four threads, seventeen, eighteen, nineteen, and twenty being unlike any of the others are placed on the chain draft and on the nineth, tenth, eleventh, and twelfth harnesses. Threads twenty-one, twenty-two, twenty-three, and twenty-four are like the preceding and go on the same harnesses, but not on the chain draft. The next four threads are unlike the others and go to complete the chain draft. These threads and the four following are marked on the thirteenth, fourteenth, fifteenth and sixteenth harnesses. The figure C which shows the arrangement of the threads is termed the "drawing-in draft" and is given to whoever does the work of drawing the threads through the heddles.

Almost all simple designs will reduce in this manner.

When the chain draft is finished we write the word "front" on the left side, in order that the person who pegs the chain shall place it on the loom correctly. Frequently a plain weave or four harness twill is marked on the left side of the chain draft and is used in weaving the selvedges, though some looms have a special attachment for this purpose.

This matter of making up chain and drawing-in drafts should be thoroughly understood before proceeding further, and it would be well for the student to combine some simple weaves into designs, drafting each as he advances.

A few more weaves for this purpose willl be found in Fig. 6. The notable ones being the basket weave, B, already mentioned, and the crow foot weave A.

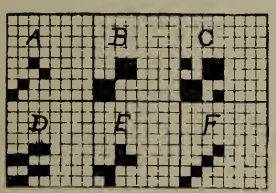


Figure 6.

M.

A PARTY of Southern gentlemen came to Washington a few days ago to spend a week sightseeing. As they turned into Pennsylvania Avenue they found themselves next to a saloon.

"Let's take a drink," said one of the party.

"We have just had one," said another.

"It would be a good idea to settle on how often we shall take a drink during our week's stay," said the third.

"Well," said the first, who just then caught sight of the ever-visible Washington Monument, "let's take a drink every time we see the monument."

"I'm agreed," said No. 2, "providing we don't take one any oftener."

"It suits me," said No. 3, "providing we do take one every time we see it."

They were faithful to their plight. But they didn't stay a week. Instead, they took the 4 o'clock train that afternoon for New York, one of them remarking to the conductor as they boarded it:

"Mosh shingler town. Everybody gone daft on Geor Washton. Put up monument to him on every shtreet corner. Georgie mush been—hic—bully boy."—*Nashville Banner.*

DRIFT OF MILL LIFE.

No man should be without a purpose in this life, and satisfied ambition is only attained by indomitable persistence.

That mill employees in general lead purposeless lives is true, but that they should be blamed for what is inevitable is an injustice. The hypercritical public are ever ready to condemn what they know least about, and in this case, there is no exception to the rule.

Apathy is a disease born and nurtured in the confines of the factory.

Mill life is not condusive to either creating or fostering the germ of ambition; in fact its influence in most instances has the directly opposite effect. Once enter the factory portals and you are no longer in touch with the world. The crowd may jostle and clamor without, but you no longer hear it Existence becomes systemized; routine becomes your motto, as you get accustomed to the life you lose interest, so to speak, in everything, even the work before you; the same day after day, week after week, year after year. No variety, no excitement to lessen the burden of ceaseless drudgery. The very monotony of the life is maddening, but as time rolls on the magnetic influence of your fellow workmen, who have long arrived at the end towards which you are slowly drifting, tells upon you, you grew indifferent (as they are) the past becomes hazy and indistinct; the future is—but the drowning hum of the machinery has a somniferous effect, you care not for the future; you are in a rut; you are no longer a human being, you have become a machine, directed and controlled by other men. When you are insufficiently lubricated, you perhaps cry out. But with what result? If you are a necessity you are given the required drop of oil; if not, you are allowed to rust or rot. It matters not which. Perhaps you have grown old, and there are so many new and improved machines.

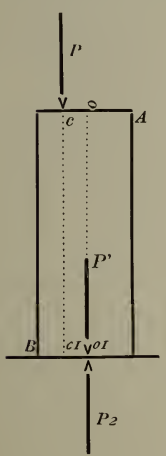
C.

MILL COLUMNS.

A column subjected to direct crushing, that is, when the resultant passes directly through the center of the cross section, may be figured by simply determining the amount of this stress and so proportioning the area of the cross section that the stress per square inch shall not exceed the working stress of the material. This, however, is not often

the case, and even when it is, cases are likely to occur where the floor loads may be so changed as to bring a greater stress upon one side of the column ; for instance, when a new mill is building and the machinery is placed on the floor supported by one side of the column, before any load is placed upon the floor supported by the other side. We should, therefore, so proportion our column that with no load on one side except the dead weight of the floor and the full floor load on the other, the column will be strong enough to stand the direct crushing due to these loads and the extra stress caused by the bending action introduced by the above manner of eccentric loading.

We will now proceed to find a method of determining the amount of these combined stresses in the column. Consider a column loaded in such a manner that the resultant passes through some point outside the centre line of the column, or in other words, through some line which does not pass through the centre of gravity of the cross section. Let A B represent a column or strut with the centre of gravity of the lower section at O^1, and let the resultant of



the forces acting upon the strut act along the line $C C^1$ when $C^1 O^1$ equals x. Let P represent this force. Consider two equal and opposite force, P^1 and P^2 acting at O^1, each equal to P and parallel to it. We shall now have a downward forces, $P^1 = P$ acting along the line $O O^1$ causing a uniform stress over the entire cross section of intensity;

$$P, = \frac{P}{A}$$

when A equals area of the cross section; and also a uniformly varying stress caused by the couple formed by the forces P and P^2 whose arm is X and whose moment is therefor P X.

The greatest intensity of compression due to this force will be at B, which represents a fibre situated at the greatest distance from the centre of gravity of the cross section, on the side subjected to compression.

To be Continued.

SHODDY.

Alec is said to have taken a cigar out of a box lately, and not being able to find a match took another one out, thus making the box a cigar lighter.

Spain is angry in not being allowed to make a cube—or do anything else just at present.

A class poet has appeared from out the frosty north and apparently with the intention of staying.

We're members of the cotton class
You'll recognize each name,
We're wise and studious as a rule
And on the road to fame.
Atkins, although in stature small,
May well rank with the tallest
For precious things are often wrapped
In packages the smallest.
The next I think you'll recognize,
But it is not my plan
To introduce him formally,
But he's every inch a Mann.
Hooker has an enquiring mind
And things are out of joint,
If he can't know the reasons why
He's our interrogation point.

Did any gentleman mention Gin Fizz?

The Mississipi colonel remained with us during the holidays and enjoyed himself hugely.

A studio stampede which is supposed to have been averted by a courageous few during fire scare of last week was in reality stopped by the judicious distribution of pretzels at the critical moment.

We understand that the second year Wool Class goes to roost in the hen coop twice a week.

THE CHAPPIE.

What an air of calm assurance,
What a pose of studied grace,
What a look of bored endurance
On that would-be blasé face.

Clothes of faultness fit and fashion,
Gloves and neckware, all au fait,
Does he really cut a dash on
Broadway, or his tailor's slate?

Hypercritical, Parisian,
Perfect breeding, how it shows
As he stares at yonder vision,
And her dainty silken hose.

See him as he orders dinner.
Cynic, man of haughty mien,
Is he not a polished sinner,
That is, as he would be seen?

See his languid, liquid stalking,
And he apes the Prince, ye know.
Hot house voice and laugh so mocking,
Critic of the passing show.

What we wonder as we wander
Is, when comes the final toot,
How he'll bear to travel yonder
With the crowd that shoots the chute.

ORMSBY A. COURT.

Lowell Textile Journal.

TEXTILE ORNAMENTATION.

By FENWICK UMPLEBY,

Headmaster of Woolen, Worsted, and Designing Departments of Lowell Textile School, Lowell, Mass.

IV.

The noble dames of old did not long remain satisfied with subjects drawn from the Old Testament for the ornamentation of their work, but required other subjects drawn from the great epic poems of mediæval chivalry, and the pleasant legends of classic times; all monastic ateliers and workshops, therefore, fell into disfavor as the people desired to have their costumes decorated with designs from subjects other than those which belonged to the church. Accordingly, secular workshops became of more importance, and from this time they began to arise in all parts of the polite world.

From a very early date we know that at the Abbey of Saint Florent de Laumer, the monks were famous for their skill in the manufacture of textile fabrics and tapestries; such monastic workshops existed everywhere. There are several documents which refer to carpets made of wool, and ornamented with flowers, animals, and portraits of emperors and kings, which were manufactured in the French convents during the tenth and eleventh centuries. The importance of these sacred ateliers everywhere declined in proportion as the secular workshops developed, and the competition of the latter with the ecclesiastical establishments was very much strengthened by the trade established by the Moors of Spain, as well as by that of Flanders and Artois. After the decay of the monastic workshops, the royal courts attached to themselves the skilled craftsmen, who had ceased to be employed in the cloisters; we have it also on good authority, that more than one great lady condescended to direct the manufacture of rich materials that were required for her own personal use and for the decoration of her home. There has been much controversy concerning the pieces of tapestry, generally known as

bayent tapestry, which, according to tradition were worked by or under the management of Matilda, the wife of the Conqueror. A photograph of this exquisite piece of fabric may be seen in the museum at South Kensington; it is a representation of the events connected with the invasion and the conquest, the size of the original is said to be one foot, eight inches wide, and two hundred and fourteen feet long. It is divided into 72 compartments, and contains more than 760 figures of beasts and birds, 623 of men, 49 of trees, 37 of buildings, and 41 of ships. Giselle, the wife of Saint Stephen, was very clever in the manufacture of textiles, and by her inducement, her royal consort, the King of Hungary, attached to his palace an establishment for weaving and embroidering, and to this queen's female servants is due the honour of the invention of the famous embroidery generally known as "Point de Hongrie," by which expression are technically known three stripes laid side by side, ladder fashion, used chiefly in embroidering the plumage of birds. The Anglo-Norman ladies are said to have been exceedingly clever in ornamenting textile fabrics. One of the most valuable of our old historians, William of Malmesbury, who lived in the eleventh century, when describing the art of weaving, says: "The shuttle is not filled with purple only, but with various colours moved, here and there, among the thick spreading threads, and by the art of embroidery the woven work is adorned with various groups of figures." The looms of Artois, which, during the terrible Merovingian period, had almost ceased to produce during the French dynasty, were revived and at last recovered their former renown. The products of these looms had already been highly esteemed in Imperial Rome, and though the Romans may have preferred the work of the Phrygians, they still had recourse to the woolen stuffs of Gaul, the reputation of which had long been universally established. The stimulus imparted to trade by the first crusade was destined to give great expansion to the art of textile ornamentation; from history we learn that the French and Italian ateliers received thereby a wide and lasting development.

Previous to the Roman invasion Britain appears to have been far behind in the art of manufacturing cloth, and knew nothing of weaving, but on the other hand they had from the earliest of times possessed native textile products, varying both in the material and

design, but of the same colors as those of the distinctive garments worn by the three traditional Bardic orders. Milton gives us a very curious description of the inhabitants of Britain previous to the invasion of Cæsar. He tells us of their warlike courage and readiness to make ambush or to make a sudden onset, of their not being inferior to the Romans in weapons and arms, and skill in encamping, embattling, and fortifying. "Their weapons," he remarks, "were a short spear and light target, a sword also worn by the side; they fought sometimes in chariots flanged at the axile with iron scythes; their bodies were for the most part naked, only painted in woad in sundry figures to seem terrible, as they thought, but, if pinched by enemies, not nice of their painting, to run into bogs up to their necks and there stay many days holding in their mouths a certain morsel no bigger than a bean to suffice hunger. Their towns and strongholds were spaces of ground fenced about with a ditch and great trees felled overthwart each other; their buildings within were thatched houses for themselves and their cattle. In peace the upland inhabitants, besides hunting, tended their flocks and herds, but with little skill of country affairs; the making of cheese they commonly knew not, wool and flax they spun not, gardening and planting many of them knew not, clothing they had none but what the skins of beasts afforded them, and that not always, yet gallantry they had, painting their own skins with several portraitures of beasts, birds, and flowers." Flax is now to be found growing wild in many parts of Great Britain, and we should suppose that in the time spoken of, some of this common, yet useful plant would then be growing in large quantities, but our forefathers must not have known its value for clothing purposes — if they had we surely should have found a trace of it in the shape of some clothing or other covering, as it was their common practice to bury their dead in the best garments they had — but we do not find any remains of fabrics of their weaving.

Dr. Rock gives us an instance of the use of woolen stuffs in these dark ages, they were not woven but plaited. He says, that while cutting through an early Celtic grave hill, they came upon a body which had been wrapped, as was shown by the few unrotted shreds still cleaving to the bones, in a woolen shroud of coarse and loose fabric, wrought by the plaiting process without a loom. How-

ever, the Britons did not spend their time idly and in vain whilst occupied in the Roman workshops, and the example set by the Romans was not lost upon the brave and noble Britons; they soon set to work to copy the arts and handicrafts of their conquerors, and during the time of the occupation, they learned the mysteries of weaving, also the culture of flax. During this period we have very little information as regards textiles. At a later time the Saxons reintroduced the manufacture of several kinds of woolen cloths, which were made chiefly for home and domestic purposes, and during this epoch the art of manufacturing cloth grew to considerable importance, and was recognized as one of the principal industries. Embroidery was introduced, and the ladies of this time also became noted for their skill in using many colored silks, as well as threads of gold and silver, an article which became universally known as English work. They were taught the use of the spindle and distaff, and we read that Edward the elder sent his son to school and his daughter to work wool. Again, the Saxons developed a national school of art, the original germs of which seem to have been brought from the North by the first Scotch and Irish missionaries, and from the South by the Roman evangelists.

A certain eminent judge who was recently re-elected, when he was asked about the facility with which he turned from one case to another, replied that he had learned that from what he saw at a baptism of colored people when he was a boy. The weather was very cold, so that to immerse the candidates they were obliged to cut away the ice. It befell that when one of the female converts was dipped back into the water, the cold made her squirm about, and in a moment she had slipped from the preacher's hands and was down the stream under the ice. The preacher, however, was not disconcerted. Looking up with perfect calmness at the crowd on the bank, he said: "Brethren, this sister hath departed — hand me down another."— *Argonaut.*

The cotton lectures given by Prof. Brooks have had a large attendance thus far, which should compensate in some measure for the trouble of organizing them.

AMERICAN COTTON MACHINERY

For the Preparation and Treatment of Fibres and the Spinning of Yarns and Threads.

WHAT IT IS AND HOW TO USE IT.

By CHARLES CLIFTON HEDRICK,
Principal of the Cotton Spinning Department of the Lowell Textile School.

COTTON OPENING AND PICKING MACHINERY.

Chapter II.

The principle of the finisher picker, so far as the opening and cleaning operation is concerned, is the same as the breaker, with the addition of the evener and long feed apron. The design is practically the same differing only in mechanical construction.

With the increasing tendency towards spinning finer yarns and since the general abandonment of the double carding system and the introduction of the revolving flat card comes the demand for a better system of picking machinery, one that will produce laps of a more uniform size and weight, and in order to eliminate any existing irregularities in the laps from the breaker, two methods are employed on the finisher. The first is by doubling four laps on the apron so that the thin or light places will be distributed over its surface. If the laps from the breaker are unrolled and held up to the light, they will be seen to consist of thick and thin places, and as the thin places are not always in the same portion of the lap, by placing one lap above another we get a more even sheet but one four times as thick. The second method is by using an evener by which the speed of the feed rolls is regulated. It must be understood that the operations of the evener depend upon the thickness of the sheet of cotton passing between the sectional plates and evener roll, and not upon the weight, and unless the cotton has been thoroughly opened, the same weight in a lap may be slightly different in thickness, thus the evener is not always absolutely perfect in its operations.

An elevation of the Kitson finisher picker is given in Fig. 25. The cotton is fed in the form of laps, which have been previously formed on the breaker. These laps, G, H, I, and L, rest upon the feed apron, D, by which they are unrolled, and it is advisable that they be of a different diameter, so that a continuous sheet, four laps thick, may pass through the feed rolls. If the laps were all of the same diameter, or nearly so, there is a possibility of two or more runs can be very quickly performed, makes a break in the four thicknesses well nigh impossible.

The evener and feed rolls are driven from the draft gear, X, on the calender head, by the side shaft, A. On the back end of this shaft is a drum, A^1, which drives the evener cone, A^4, by means of the belt, A^5. This belt passes over the carrier roll, A^2, and under the binder cone, A^3, which can be lowered, for taking up the slack, as the belt stretches. The worm

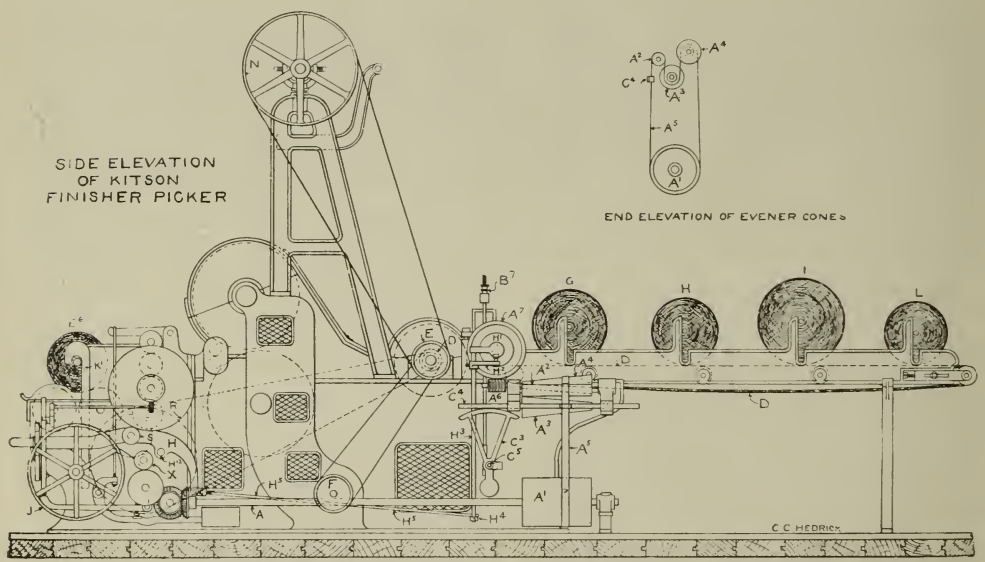
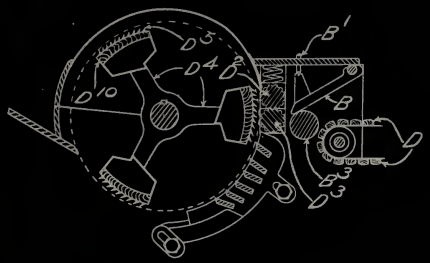


Figure 25.

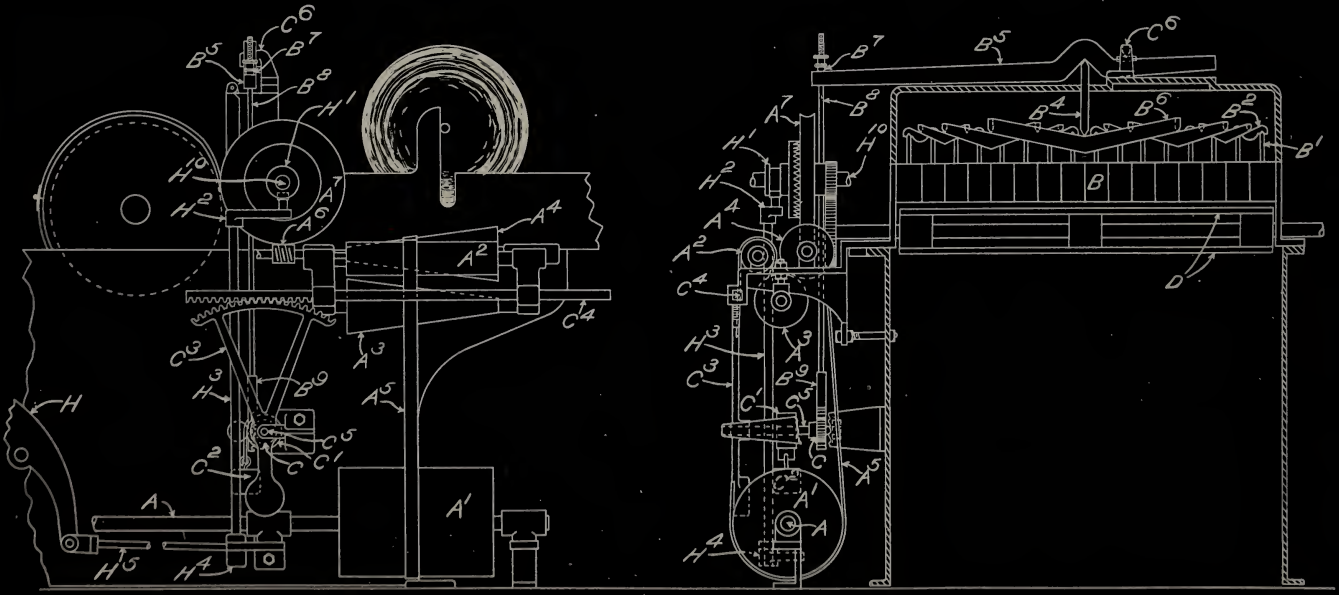
ning out at once, and, during the time required to replace them a break is liable to occur in the continuity of the four thicknesses but with the laps of a different diameter, the replacement of one, which

gear, A^7, which is connected directly to the evener and feed rolls, is driven directly by the worm, A^6, on the end of the cone, A^4. Reference may now be made to sheet number three on which is



CARDING BEATER.

RIGID BEATER.



EVENER.

FINISHER PICKER.

shown a side and an end elevation of the evener, also a section of the rigid and carding beaters. The laps are carried forward on the feed apron, D, and are drawn between the evener roll, B^3, and the sectional plates, B, then between the feed rolls, D^2, and, D^3. These sectional plates, of which there are sixteen, extend across the whole width of the face of the evener roll. Resting in a socket on the top of each of these sectional plates are short rods, B^1, which support saddles, B^2. These saddles are connected to the stem, B^4, by other and larger saddles, all of which act as levers, the stem forming a connection between the top saddle, B^6, and the top lever, B^5. This top lever which has its fulcrum at, C^6, is connected at its long end by a rod, B^8, the lower end of this rod terminating in a rack, B^9. On the quadrant shaft, C^5, is a pinion, C, which is in gear with this rack.

When the position of these sectional plates is changed, by reason of a difference in the thickness of the sheet of cotton passing under them, the quadrant shaft is turned slightly, by the connections just described and being connected to the cone belt guide, C^4, by the quadrant, C^3, the belt is moved along the cone, thus changing the speed of the evener and feed rolls. This will continue until the thick place in the lap has passed by the sectional plates, when they will return to their normal position.

In order that the sectional plates shall not rise too easily, a drum, or weight pulley, C^1, is fastened to the quadrant shaft. Around this pulley, and fastened to it, passes a strap, the lower end being connected to a weight hook, upon which is hung a weight, C^2. The sectional plates are by this means firmly pressed down upon the lap.

Having given a general description of the working of the evener in connection with the finisher picker, there yet remains to describe the device by which the worm gear is caused to engage with the evener and feed rolls upon the starting of the calender head.

In Fig. 25 it will be seen that the worm gear, A, and the calender head gearing, which are revolving all of the time that the picker is running, are driven independently of each other, the worm gear being driven from the draft gear, X, and the calender head gearing from a pinion on the opposite side of the calender head, this pinion being on the same shaft as the draft gear.

When the calender head is started the drop lever is raised and the pinion, S, is brought in

contact with the gear, R, and at the same time the evener and feed rolls are started by means of the clutch, H^1, being thrown into contact with the worm gear. This clutch is connected by a crank, H^2, to the upper end of the upright shaft, H^3. The lower end of this shaft is connected to the drop lever, by an arm, H^4, and shipper rod, H^5.

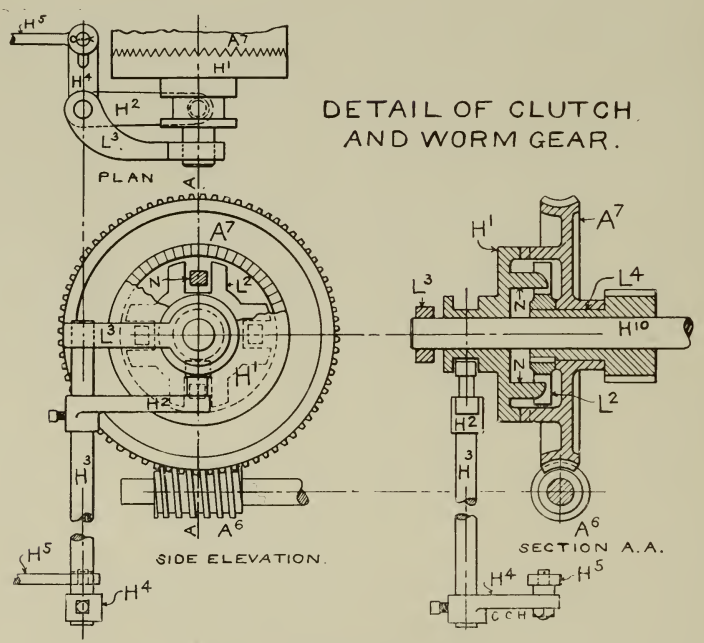


Figure 26.

An enlarged section, an elevation and a partial plan of this clutch and worm gear are shown in Fig. 26. On the stud, H^{10}, is a sleeve, L^4, with a gear on one end and a dog or driver, L^2, keyed to the other end. The clutch, H^1, has lugs or bosses, N, which project outward between the arms of this dog. The worm gear, A^7, which runs loose on the sleeve, has teeth upon one side which engage with the teeth in the clutch. When the clutch is thrown out, the worm gear runs without imparting motion to the evener and feed rolls, but when the calender head is started, the shipper rod, H^5, is drawn forward by the raising of the drop lever, causing the clutch to engage with the teeth of the worm gear, the sleeve being driven by the lugs, N, projecting out between the arms of the dog, L^2.

CARDING BEATER.

Next to the evener, a beater, which will remove the greatest amount of dirt without excessive injury to the fibers, has received as much attention as any part of the picker. Of the different styles of pin beaters which have been used, from time to time, the Kirschner carding beater gives the best results.

By referring again to sheet number three, on which is shown a section of this beater, it will be seen that it consists of three wooden lags, D^{10}, securely fastened to the arms, D^4, of the beater shaft. From these lags project steel pins, D^5, each row of pins farther from the center than the row preceeding it. This beater combines the carding and beating action, the pins penetrating the tufts of cotton, thoroughly separating and dividing them. The cotton is thus deposited on the cages in a finer and more even sheet, and the work of the card is slightly lessened. Notwithstanding the claim made by many to the contrary, the carding beater is capable of removing more dirt and leaf than the rigid beater, but its action on the fiibres is much harsher, particularly on long staple cotton. Yarn spun from cotton cleaned on pickers, provided with rigid beaters, will break, on an average, five pounds stronger than when the carding beater is used on the finisher. Hence when spinning some qualities of yarn the carding beater is omitted in the cleaning process. For general use on all classes of work, however, this beater is used on the finisher picker with good results. In setting the beater grid with the carding beater, less clearance is left between the beater and grid bars than with the rigid beater, about $\frac{1}{8}$ in. being an average. The dust and dirt from beneath the beater should be removed from the breaker once a day, while from the finisher once in two days is as often as is necesssry.

The laps of the finisher picker should be weighed about once every hour, and if the weight varies too much the cone belt is moved slightly along the face of the cone, by turning the nut, B^7, on the top lever of the evener.

FRICTION LET OFF FOR LAP RACKS.

A front and a side elevation and a section of this device are shown in Fig. 27. The lap which is wound upon the lap roll, F^3, is held in contact with the lap calender rolls, D^9, by the racks, K and K^1, which bear upon either end of the lap roll. The top of

these racks is recessed to receive two rolls, F^1 and F^2, which form roller bearings, greatly reducing the friction and wear upon the lap roll. The lower end of the rack, K, is in gear with the pinion, W, while the rack, K^1, is in gear with the weight, M, the face of the break lever, which bears against the pulley, being lined with leather. As the lap increases in diameter it draws up on the racks, which are kept from rising by the friction of the break lever against

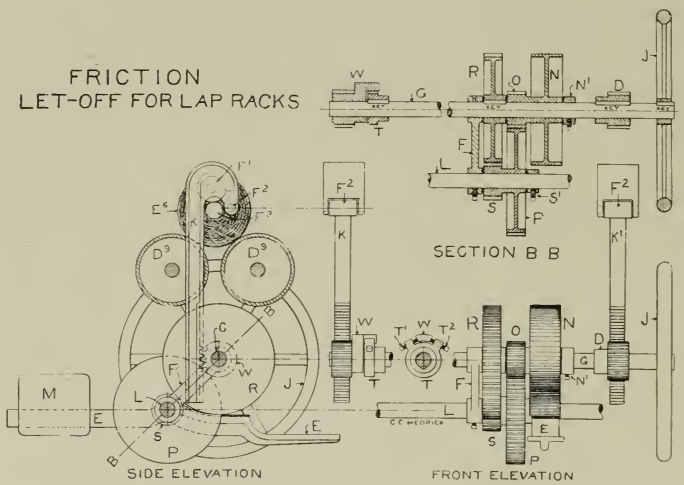


Figure 27.

the pinion, D, both of these pinions being secured to the rack shaft, G. The gear, R, also on the rack shaft is connected with the pinion, O, which is on the hub of the break pulley, N, by the gears, S and P. These gears turn loose on the shaft, L, being held in position by the collars, F and S^1. The break pulley, N, is free to turn on the rack shaft, and is held in position by the collar, N^1. Loose upon the shaft, L, is the break lever, E, which bears against the under side of the break pulley, and is kept in contact with it by the break pulley. When the lap has been wound to its full diameter, the attendant presses down upon the break lever, releasing it from contact with the break pulley. The rack may then be raised by turning the hand wheel, J, on the end of the rack shaft. In order to bring both racks the same height so that lap will be wound equally in diameter on each end, the pinion, D, which gears into the rack, K^1, is keyed directly to the rack shaft, while the pinion, W, which gears into the rack, K, is connected to the rack shaft by

a lug projecting out between the arms of a dog or carrier, T, which is keyed to the rack shaft. In the arms of this dog are adjusting screws, T^1 and T^2, which bear against the projecting lug of the pinion, W, by turning these screws the pinion may be moved a slight distance around the rack shaft in either direction, bringing the rack, K, exactly in line with the rack, K^1.

It is often necessary, particularly on warm, damp days, to move the weight, M, in from the end of the break lever, reducing the pressure of the lever against the break pulley, sometimes it being necessary to remove the weight entirely.

CALCULATION.

The laps on the apron of the finisher picker weigh about 15 ounces per yard, and as there are four laps on the apron, the combined weight of the laps entering the finisher is 60 ounces per yard. The weight of the lap from the finisher is 15 ounces per yard, and as the weight entering it is 60 ounces, it is evident that some means must be provided to reduce the weight to 15 ounces. This is accomplished by introducing a certain amount of draft, between the feed rolls and the lap calender rolls. By the word draft, as applied to cotton spinning machinery, is meant the ratio of the length of the lap which passes the calender rolls in a given time, to the length which passes the feed rolls in the same time. Thus if the circumferential velocity of the feed rolls is 25 feet, while in the same time the velocity of the lap calender rolls is 100 feet, or four times as much, we should have a draft of four, and it follows that if the combined weight entering the feed rolls is 60 ounces per yard, the weight being delivered will be one-fourth as much or 15 ounces per yard.

We will, for the sake of making this clear to those who are not familiar with the subject, call the weight of each of the laps on the apron of the finisher 16 ounces per yard, and the lap being delivered by the finisher 15 ounces per yard. The draft would then be 4.2 which may be found in the following manner:

Rule 3.

$$\frac{\text{Number of laps on the apron x weight per yard}}{\text{Weight of lap being delivered}} = \text{draft.}$$

Example:

$$\frac{4 \times 16}{15} = 4.2 \text{ draft.}$$

If the draft is already known and it is desired to find the weight of the lap being delivered:

Rule 4:

$$\frac{\text{Number of the laps on the apron x weight per yard}}{\text{Draft}} = \text{weight.}$$

Example:

$$\frac{4\text{x}16}{4.2} = 15 \text{ ounces weight per yard.}$$

After the draft has been calculated — which in this case we have found to be 4.2 — the draft factor or constant number must be found, by which the number of teeth in the draft gear may be determined. On sheet number four is shown a diagram of the gearing of both breaker and finisher pickers. The constant number or draft factor for the finisher may be found in the following manner:

Multiply all of the drivers and the diameter of the lap calender roll together, and divide their product by the product of the driven gears multiplied together with the diameter of the feed roll, leaving out all intermediate gears and representing the draft gear by the letter Y.

Rule 5.

$$\frac{\text{Dia. of lap calender roll x18x14x14x30x54x3}\tfrac{1}{4}\text{x85x28x12}}{\text{Dia. of feed roll x37x73x76xYx40x10x1x20x16}} = \text{draft factor.}$$

Example:

$$\frac{9\text{x}18\text{x}14\text{x}14\text{x}30\text{x}54\text{x}3\tfrac{1}{4}\text{x}85\text{x}28\text{x}12}{2\tfrac{1}{8}\text{x}37\text{x}73\text{x}76\text{x}Y\text{x}40\text{x}10\text{x}1\text{x}20\text{x}16} = \frac{4774497436800}{55835072000} = 85.51 \text{ factor.}$$

To find the number of teeth in the draft gear:

Rule 6.

$$\frac{\text{Draft factor}}{\text{Draft}} = \text{number of teeth in draft gear.}$$

Example:

$$\frac{85.51}{4.2} = 20 \text{ teeth.}$$

To find the draft when the number of teeth in the draft gear is known:

Rule 7.

$$\frac{\text{Draft factor}}{\text{Teeth in draft gear}} = \text{draft.}$$

Example:

$$\frac{85.51}{20} = 4.2 \text{ draft.}$$

We will now prove this factor to be correct, by substituting 20 teeth in the place of Y, as in example 5:

$$\frac{9\text{x}18\text{x}14\text{x}14\text{x}30\text{x}54\text{x}3\frac{1}{4}\text{x}85\text{x}28\text{x}12}{2\frac{1}{8}\text{x}37\text{x}73\text{x}76\text{x}20\text{x}40\text{x}10\text{x}1\text{x}20\text{x}16} = \frac{4774497436800}{1116701440000} = 4.2 \text{ draft.}$$

In the same manner we can figure the draft of the breaker picker, but as the amount of cotton fed to the breaker is rather indefinite — being governed by the degree of fullness of the hopper — the gearing after having been established by the machine builder is seldom changed.

To find the speed of the beater on the finisher picker:

Rule 8.

$$\frac{\text{Speed of countershaft x diameter of pulley on countershaft}}{\text{Diameter of pulley on beater}} = \text{speed of beater.}$$

Example:

$$\frac{500\text{x}24}{8} = 1500 \text{ revolutions.}$$

To find the speed of fan:

Rule 9.

$$\frac{\text{Speed of beater x diameter of pulley on beater}}{\text{Diameter of pulley on fan shaft}} = \text{speed of fan.}$$

Example:

$$\frac{1500\text{x}5}{8} = 937.5 \text{ revolutions.}$$

To find the delivery of the calender roll in yards per minute:

Rule 10.

$$\frac{\text{Revs. of beater x diameter of feed pulley x14x14x18x circumference of lap calender roll}}{\text{Diameter of pulley on calender head x76x73x37x inches per yard}} = \text{yards}$$

Example:

$$\frac{1500 \times 4\frac{1}{2} \times 14 \times 14 \times 18 \times 28.27}{24 \times 76 \times 73 \times 37 \times 36} = \frac{673221780}{177358464} = 3.795 \text{ yards.}$$

To find factor for production of picker:

Rule 11.

$$\frac{\text{Revolutions of beater} \times 14 \times 14 \times 18 \times \text{circumference of lap calender roll}}{\text{Diameter of pulley on calender head} \times 76 \times 73 \times 37 \times \text{inches per yard}} = \text{factor.}$$

Example:

$$\frac{1500 \times 14 \times 14 \times 18 \times 28.27}{24 \times 76 \times 73 \times 37 \times 36} = \frac{149604840}{177358464} = .8435 = \text{factor.}$$

To find the production of picker:

Rule 12.

$$\frac{\text{Factor} \times \text{dia. of feed pulley} \times \text{minutes run per day} \times \text{weight of lap per yd.}}{\text{Ounces per pound}} = \text{production.}$$

Example:

$$\frac{.8435 \times 4\frac{1}{2} \times 600 \times 15}{16} = 2135.10 \text{ pounds.}$$

(*To be continued.*)

Early in January, Mr. William P. Atwood of the Hamilton mills delivered the fifth lecture of the course at the Textile School. The subject was the "Dyeing of Textiles," and although dealing with a subject requiring many technicalities to explain, he held the attention of the uninitiated as well as those well posted in this branch of textile manufacture. About fifty different cloths of various patterns and colors were used to illustrate the latter portion of the lecture together with several experiments which served to make things more clear.

"Our society," said the young woman who belongs, "has decided that bloomers shall be barred."

"How vulgar," said the girl who does no belong. "They ought never to be in other than solid colors." — *Indianapolis Journal.*

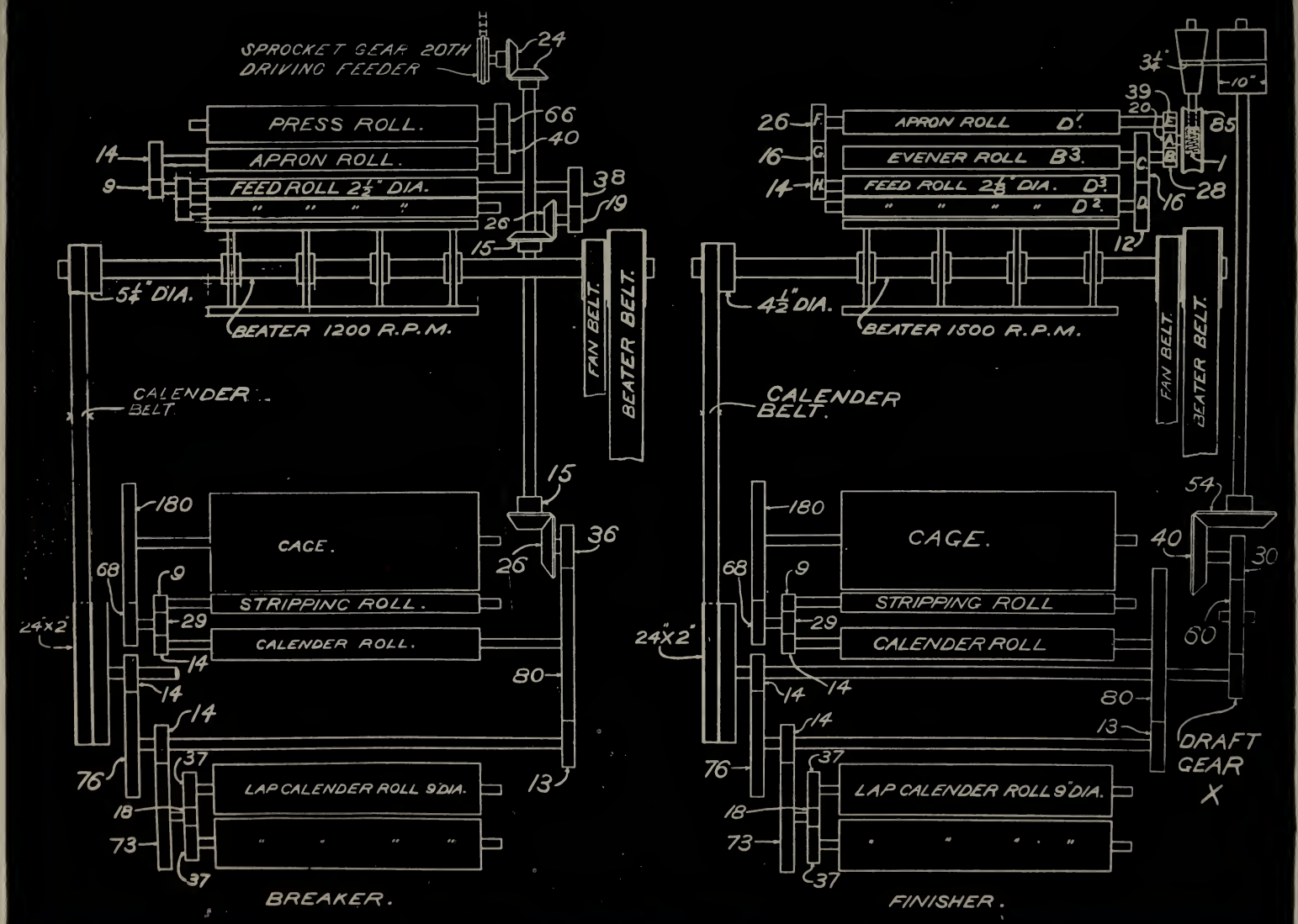


DIAGRAM OF PICKER GEARING.

THE LOWELL TEXTILE JOURNAL.

PUBLISHED MONTHLY
AT
No. 67 Middle Street, = Lowell, Mass.
BY
THE LOWELL TEXTILE JOURNAL COMPANY.

W. M. HASTINGS, Editor.
A. B. FELS, Treasurer.
E. D. Chace, Advertising Agent.

Entered at the Post-Office at Lowell as Second Class Mail Matter.

SUBSCRIPTION TERMS.

For one year, postage prepaid $1.00
Single Copies 10
For Sale at all Newsdealers . . . . . .

Advertisements must be at the Journal Office before the twenty-fifth of each month for insertion that month.
Contributions may be sent to Editor of The Lowell Textile Journal, and will receive prompt attention.

EDITORIAL.

The woolen man has not been in such high feather for some years as he is to-day, and he can very easily snap his fingers at the cotton manufacturer who has the blues and say, "What care I?"

The demand for his goods is strong and best of all is one which obliges him to throw out the cotton warps and cheap fillings of last year and replace them with a good quality of wool.

No doubt the tariff has had much to do with this state of affairs, but much is also due to the abundance of money in the west just at the time when prices began to rise. A good wheat crop means new clothes and also good clothes to the western farmer, so that while the present laws remain in force and we can manufacture our own woolens without fear of competition, there is no reason why we should not continue to enjoy prosperity in this trade as well as in many others.

. . .

During the present strike much has been said about the fining of weavers. In fact the weavers themselves have brought this up as one of their grievances, and in rather a misleading manner.

When the stock for a cut of cloth has been paid for, that is the raw material, and the labor thereon up to the time when it is given to the weaver to make into cloth, we see no reason why, when this man damages it, he should not be obliged to pay something towards repairing, or in case the cloth is thrown into seconds, or worse still the rag heap, that he should not pay some portion of the loss.

Good weavers do not have occasion to complain that ten, twenty, or thirty cents have been withheld from their wages because they have faults in their cloth. They realize that it pays to be careful. We have frequently noticed that the quickest weavers, those who could turn off the

largest number of cuts per week, were seldom fined. This was simply because they were always on the alert and did not allow finable damages in their cloth to run through unremedied.

As regards the bookkeeping of the cloth-room there is but little to say. In many small mills the weavers themselves are allowed to examine entries of measurements of their own cloth. If this is not convenient as in large plants their representatives are permitted to do this for them.

* * *

The question of textile school appropriations which has recently come into some prominence in the legislature is of considerable interest to Lowell people just at present.

Shortly before the New Bedford bill was tabled, Mr. Bennett, of Saugus, said in effect that as a textile school is of so much benefit to the city in which it is located, and of so little benefit to the state as a whole that it was a pertinent question whether the city should not be obliged to cover the entire expense.

We fail to see the applicability of this statement to the Lowell school, for although the majority of students do come from this city, a fair percentage is from other parts of the state and from other states. No one can say that these latter men benefit the city only, or benefit the state but little as a whole. If they attain the standard set by Mr. Whitaker there will be no question whatsoever on this score. He says, "the personal characteristics of the graduate student will determine the extent to which he will be capable of promoting manufactures. Is he well qualified by nature? Is he disciplined? Are his powers of body and mind and spirit under his complete control? Has he a right purpose? Does he shun alcohol, tobacco, and other narcotics, sensuality, and profanity? Has he physique, brains, endurance, forethought, judgment, cordiality, courtesy, common sense, good taste, breadth of view, push, dash, persistence, industry, system, integrity, con science, tact, energy, vim, will power? Has the school caused the finest characteristics of manliness, which are the most valuable of scholarly attainments, to develop and ripen, while yet the mind is intent upon fibres and fabrics, colors and chemicals, machines and processes, drawings and designs, books and pupils, teachers and trustees? The Lowell Textile School will be good as a school, to the extent that it exercises a forceful and beneficent

influence in the making of men and women. It will be as good a textile school, to the extent that it influences the bounding life of an excellent, intelligent, and well equipped manhood and womanhood to devote itself to the promotion of textile manufactures."

When one thinks of the good that a school of this kind can do, the price sinks into insignificance. For those who still consider it important, however, it might be well to say that the outlay during the first year of any school is undoubtedly heavy, but when the management have run it long enough to manufacture goods so that it can show some earnings above the tuition fees, neither the state nor the city would be troubled greatly by the amount of deficit that would have to be made good.

Until then it seems fair that the expenses should be divided equally.

. . .

Another lecture of the Textile School course was given on January 24th, by Mr. Jagerhuber, president of the Textile American Publishing Company, New York. The subject was, "New York as a Textile Mart."

Mr. Jagerhuber treated his subject in a masterly manner, giving clear definitions of the package and piece trade, the inside workings of commission houses handling both foreign and domestic goods, and the immense amount of money moved in this trade each year.

He touched also on the buying and selling agents, and gave a very interesting account of the trade sales which are conducted at intervals in order to get rid of certain lines of goods.

The hall was filled with an interested audience composed largely of business men and students, and others directly interested in this end of the textile industry.

"No, there ain't no barber in the village," said the landlord of the Excuselessville tavern, in reply to the question of the solitary drummer. "You'll have to shave yourself, but if you want your hair cut I guess the editor of the *Bugle* can accommodate you."

"The editor?"

"Yep; he's the handiest man in town with the shears."— *Judge.*

At Niagara — She — How the falls roar!

He — If you had to listen to so much talk from newly married couples as Niagara does, you would want to make a roar yourself. — *Cincinnati Enquirer.*

COTTON WARP SIZE.

The warp yarns of nearly all cotton fabrics require to be sized. If we take a piece of warp yarn, as it comes from the spinning frame, and place it under a magnifying glass, we will see that we have not got a smooth, solid thread, as there are many cavities in it, owing to the imperfect fitting of one filament against another. The short length will project from the surface of the yarn, giving it a hairy appearance. It would be impossible to weave single yarn in this form without further preparation, owing to the strain and friction in weaving. It is not my intention, nor would it be possible for me to give all the mixes of size, as they are countless; almost every dresser has some recipe of his own which he esteems above all others.

There is not a more abused room in the mill than the slasher room, nor is there a room, where if common sense and good judgment were used in the mixing and applying of size, that there could be so much saved to the mills. A brief description of the sizeing machine will suffice for all purposes. At one end of the frame is the creel, which carries the service of warping or section beams, sometimes termed "back beams" from the fact that they are placed at the back of the sizeing machine. These beams are generally placed in the creel in two tiers to unwind in opposite directions, the yarn of the first coming off the top and passing under the second, which is in the lower tier, the yarn from both then coming upward and passing over the third, and bringing the yarn of that beam also. This goes on until the last beam of the set is reached. It then passes over two small rolls in an even sheet, and decends into the size box. This box contains a series of rollers, first the immersion roll, second the pair, called the sizeing rollers, and third the pressure or finishing rollers. The immersion roller and the two bottom rollers of the pair are made of copper. The two top rolls are made of iron and covered with flannel. The yarn passes under the immersion roll up and between the blanketed and copper rolls, thence over the largest of the two cylinders, almost encircling it, and around the small cylinder in like manner. These cylinders are heated by steam at a pressure of

from 5 to 15 lbs. per square inch. The yarn on leaving the small cylinder travels a little above the floor to a small roll on the same level, ascending to and over the measuring roll, then through an expansion comb to the tension roll and onto the loom beam. To keep the yarn from sticking together, there are a series of iron rods placed between the measuring roll and comb, which separates the threads of one beam from those of the other.

The materials used for the sizeing of cotton yarns may be grouped into two classes, organic and inorganic. The former consists of wheat flour, rice flour, dextrine, corn starch, sago, and farina or potato starch.

The latter class is composed mainly of chloride of magnesium, china clay, epsom salts, and chloride of zinc. Rice flour is not very much used at the present time, owing to its nonadhesiveness, it also gives the yarn a harsh, wirey feel which is detrimental to good weaving. With suitable softness it forms a fairly good mix for light sizeing. Sago is the pitch which is extracted from the palm tree, dried, ground into a fine powder, and imported under the name of sago flour. Like rice starch it soon becomes watery and loses its adhesiveness. It should not be made up until wanted.

In the sizeing of yarns the mixer should strive to make a size that will give the thread a smooth, soft feel, and yet not chafe in weaving, and also have the yarn retain its elasticity as much as possible. Sizers should ascertain if possible to what use the cloth is to be put. For instance, where the cloth is to be bleached or dyed, paraffin wax should never be used, as it forms a resist against either a bleach, dye, or print. Soaps should never be used in the size if chloride of magnesium or other salts are to be added, for they would become decomposed and an insoluble compound be formed. The softening ingredients most commonly used are tallow or stearin, palm, coco, castor, olive, and other vegetable oils. Glycerine is one of the best of softeners on account of its hygroscopic properties by which it will retain china clay upon the warp where the fats and oils could not retain it. This should not be used in excess, however, as it has a tendency to make the cloth feel damp.

In mixing size, care should be taken to use those ingredients that will help the yarn retain its natural moisture, also to attract

more, up to a given point, from the atmosphere. For this purpose we use a pure deliquescent; the one most commonly used and also the best is chloride of magnesium. But in using a deliquescent there is apt to be more moisture attracted to the yarn than is necessary, which would cause the cloth to mildew. To prevent this an antiseptic should be used. Chloride of zinc has proved to be the most efficient.

There are many different opinions on the of time that size should be boiled, varying from 15 minutes to two hours. In using corn starch, I should recommend cooking at least one hour, potato starch a little less time.

When china clay is used, it is best to boil about two hours in a separate kettle, then draw it into the prepared size and cook the whole 20 minutes.

In some cases where we wish to give the yarn a soft, crispy feel, astrigents are sometimes used with very good results, but I should not recommend their general use. Two parts water to one part starch, is about the right proportion for light sizeing, and should Twaddell 15° to 20°. For heavier sizeing the mixes should be made from 25° to 40° Twaddell, according to the per cent. required on the yarn.

Mr. F. L. Leavitt.

MILL COLUMNS.

[Continued.]

If we let p2 equal this stress we shall have according to the principles of applied mechanics relating to bending action,

$$p_2 = \frac{P\,x\,y}{I}$$

Where y is the most distant fibre from the neutral axis, in this case, B O', and where I is the moment of inertia of the cross section taken about its neutral axis.

We thus have for the greatest fibre stress to which the column is subjected,

$$p = p_1 + p_2 = \frac{P}{A} + \frac{P\,x\,y}{I} \qquad (1)$$

The general expression for the moment of inertia about any axis may be written as the double intirgral of $x^2\,dx\,dy$, and may be found for any cross section by performing the above integration. In any engineer's hand-book ex-

pressions may be found for the moments of inertia of various cross sections about their neutral axes, and consequently it will be seldom necessary to work out the above.

In order to illustrate the above method we will assume a column of yellow pine, circular in section, 8 inches in diameter and 12 feet long, having a hole $1\frac{1}{2}$ inches in diameter through the center. Load on one side due to floor alone, 3000 lbs.; load on other side due to weight of floor and machinery, 5000 lbs. Each load is applied at a distance of ten inches from the centre line of column, *i. e.* the brackets at the top of column which support the floor girders extend each, 10 inches. This will give a resultant load equal to 8000 lbs. To find how far this resultant is distant from centre line of column, *i. e.* x in the above formula, it is necessary to take moments of all the loads acting about some assumed axis and divide the sum of the above moments by the sum of the loads.

Proceeding in this manner we find x to be $2\frac{1}{2}$ inches.

The expression for the moment of inertia of an annular disk with outer radius R, and inner radius r is

$$I=3.1416\ \frac{(R^4-r^4)}{4}$$

which in our case will be

$$3.1416\ \frac{(4^4-.75^4)}{4}=200, \text{ nearly.}$$

We found above that $x=2.5$ inches, and in this case y must be 4 inches, the radius of the column. The area of the cross section will be

$$3.1416\ (R^2-r^2)=3.1416\ (4^2-.75^2)=48.5 \text{ in.}$$

We shall now have for the greatest fibre stress, from (1)

$$p=\frac{8000}{485}+\frac{8000\text{x}4\text{x}2.5}{200}=465 \text{ lbs. per sq in}$$

The greatest allowable breaking strength for yellow pine under compression is about 3400 lbs. per sq. inch, in cases where the ratio of length to diameter does not exceed 20, and if we use a factor of safety of 5 we shall have for the working strength of the material about 680 lbs. per sq. inch. We thus see that that our column is within the limit of safety.

In the above case the line of action of the resultant of all the forces acting on the column passes within the cross section. Cases may arise, however, where the line comes outside the column and then a method must be used to bring it within before the above method can be used to determine the maximum fibre stress.

P. M. S.

AS ANSWERED BY HECTOR.

Is it advisable to elevate the rear of boxes in box looms and if so, how?

Ans. It is most certainly advisable. You cannot elevate the picker, and as it is an advantage to have the back of the shuttle raised a trifle, the only way to accomplish this is to elevate the back of the boxes.

Thus you get the desired effect of having the shuttle stuck higher up the picker, and as the picker comes forward, the back of the shuttle must remain elevated until after it is released.

From a point low down on the lifting rod I should bend it outwards from the loom. A mere trifle is sufficient.

Say, Hector, what kind of a shuttle would you choose for general work?

Ans. I should have one with as much taper at the point as possible. The more taper there is, the more time you have before the largest part of the shuttle comes in contact with the yarn at the selvedges, for, as the lay travels back at the same time that the pick is taking place, then also the space formed by the shed is widening, and the farther the shoulder of the shuttle is from the tip the more time you gain before the shoulder reaches the yarn. In like manner there is a gain of time at the finish of the pick because the shoulder of the shuttle is out of the shed sooner.

The March number of the Textile Journal will contain an article on "Is Art of Value in Textiles?" by Vesper L. George, and also a continuation of the papers, entitled: "Talks with Beginners in Designing."

ADVANCE EXTRACT FROM A REPORT ON

TEXTILE EDUCATION IN EUROPE.

By CHRISTOPHER P. BROOKS.

Director of the Lowell Textile School, Lowell, Mass.; Member of the Permanent Bureau of the International Congress of Technical Education as Representative of the United States.

The number of textile schools in Europe in the first rank, that is, schools giving courses of day instruction, both theoretical and practical, and in such a manner as to qualify a man to become a manufacturer, probably does not exceed twenty. Those schools in which instruction is given in the evening classes for the benefit of artisans, or in which Sunday courses or intermittent lecture courses are given, probably number at least one hundred.

Textile schools are found in the highest grade in Germany, especially in Prussia. The Prussian textile schools are all under the direct control of the government and are all managed on similar lines to one another. The school of Mulheim on the Rhine is the oldest of existing schools, and its work was commenced in 1849. This school is doing good work now, although later schools surpass it in equipment. So excellent a reputation did this school enjoy up to twenty years ago, that a deputation of Yorkshire (English) manufacturers, who visited the continent in 1876 to

report on the state of textile education in Europe, styled it as one of the most complete on the continent.

There have been organized during the last twenty years several schools which have now taken precedence of that at Mulheim. England has perhaps most examples of very modern schools, as the movement in that country has only been popularized since about 1885. There are now in England one hundred institutions of greater or less importance where textiles are systematically taught.

Textile schools are of various origins. On the continent of Europe many have originated through the guilds and weavers' societies, of which we have no parallels in this country. They were associations of weavers for mutual benefit, some established for the education of the younger members of the guilds, and others for mutual protection and advancement.

ORIGIN OF TEXTILE SCHOOLS.

A large weaving school in Berlin originated in the first instance with the United Guild of Weavers of Berlin, and a notable example of a guild governing and managing a textile school is to be found in the textile department of the Yorkshire College, in Leeds, England, which has been equipped and supported throughout its history by the Cloth Workers' Company of London.

Sometimes a school has originated from an association of workmen bent on their own higher education, as is to be found in Oldham, England, in what is known as the Oldham Mutual

Technical School, which has developed in this manner.

The desire of the manufacturers of a town or city to improve the status of their assistants, to educate overseers and managers, has been another cause of the establishment of textile schools. An example of this is found in Mulhausen, in Alsace.

The schools of Crefeld and Roubaix originated in this manner. Occasionally it has been found that the owner or owners of very large works have built a school especially for the benefit of their employees. There are several examples of this, a notable school being that of Messrs. Howard & Bullough of Accrington, England.

VARIETIES OF CONTROL AND MANAGEMENT.

In schools established in such a variety of ways there are naturally

many different systems of control and management, of instruction, of equipment, and of awards of diplomas, found in the same country; but there is being evolved a system in almost all countries to invest control in a central authority, usually the government, and to arrange for the management of schools to be by local authorities, subject to the approval of the government and other inspectors. Even since my first visit to European schools, in 1891, and on the occasion of subsequent visits, I have seen considerable change tending in this direction, especially in Germany.

All Prussian spinning, weaving, dyeing, and finishing schools are placed under the direct charge of the Minister of Commerce in Berlin, and are not placed under the Minister of Education,—showing the recognition of the German government that these schools are a necessity to the commercial well-being of the country, and not merely an educational requirement. The officials of the Prussian schools are government officials. The school is placed under the charge of a director, in all government schools, who is in co-operation with a committee of local manufacturers, bankers, and local educational officers. The director of the school shares in the privileges of all government service, and after a certain number of years of service is pensioned at two-thirds his salary.

Supplement to The Lowell Textile Journal.

* THE COTTON YARN PREPARATION DEPARTMENT OF THE LOWELL TEXTILE SCHOOL.

By Channing Whitaker, Lowell, Mass.

The paper which I am about to read relates to a department of the school into whose work the question of the design of the fabric does not enter. But, unless the yarn is a success and skilfully adapted to the design of the fabric, the fabric will not be a success.

THE MOST IMPORTANT RESULT OF TECHNICAL EDUCATION.

In the earlier period of American technical education it was urged by some that while classical education developed the natural abilities of men it failed to fit them for the duties of life, and that technical education was superior because that fitted them for those duties. Others thought that even if technical education was thus utilitarian, it would necessarily fail to develop those finer characteristics of manliness which were the natural results of classical education. Within the recollection of the writer, there were in the technical schools teachers whose fundamental aim and loftiest effort for their pupils was to promote the acquisition by them of scientific principles and practical arts. But gradually the important fact came to be appreciated, that the fundamentally noticeable and important result of excellent technical education, which completely overshadows its purely utilitarian result, is the part that it plays in the making of the man. In technical, as in classical, education the training is of

* Reprinted by permission from the Transactions of the New England Cotton Manufacturers' Association, No. 63, at the semi-annual meeting held at Philadelphia, October 27-28, 1897.

first consequence and the subject-matter, secondary. What MOXOM has so well said of education in general might have been said of technical education with equal truth: "The end of education is not knowledge simply, nor skill, nor power to do things, but manhood and womanhood. Education is a process, not so much of accretion as of unfolding, and its end is not specific attainments but largeness and symmetry and sweetness and forcefulness of the whole nature."

But technical education is not unimportant from a purely utilitarian aspect. As the beneficent influence of technical education has extended, the rapidity of the advance in every practical art has increased, until the doings of ten or even five years ago in such an art is apt to be ancient history. Even the art of education, of technical education, is no exception in this respect.

LABORATORY METHODS ARE PREFERABLE IN THE CULTIVATION OF MANLINESS AND IN THE ACQUISITION OF SCIENTIFIC PRINCIPLES.

Notice the advance which has occurred in the common methods for the teaching of physics. Formerly, the method most highly approved was that of the eloquent lecturer whose delightful explanations and skilfully conducted illustrative experiments charmed the class. Now the approved method is by the experiments of the pupil under the direction and oversight of the skilful teacher, whether the pupil is in an ordinary high school or in the Jefferson Laboratory of Harvard University. Under modern methods the observing, thinking, acting, pupil has taken the place of the pupil who was acted upon by the lecturer. The fascination which attended the brilliant unfolding of scientific principles by the lecturer of the earlier time can never be forgotten, and one's gratitude to the lecturer will never pass away, but he is blind who cannot perceive the more rapid development of manly qualities and the greater intensity of the delight which naturally attends the personal discovery of truth, when one makes search for it armed with suitable appliances and under the direction and supervision of wise leadership. A

stupid is wholly out of place as the director of a physical labratory, but, given a man who is in every sense the peer of the earlier lecturer, give him the best modern appliances for directing the re-discovery of the known principles of physics by experiment, and you have, in the man and the appliances, better means than formerly for the making of a man, better means than formerly for becoming acquainted with the principles of the science. Under the modern conditions of the laboratory method of education, the teacher has a better opportunity for observing the habits and characteristics of his pupils and for influencing the making of the man, while the pupil has a clearer and a more permanently impressed conviction of the truth which has been the subject of study, and his resultant mental vigor is of a more fearless, aggressive and successful type.

THE LOWELL TEXTILE SCHOOL EQUIPPED WITH LABORATORIES AT THE OUTSET.

It is fortunate for the newly organized Lowell Textile School, that, before its inception, the current, in the older American technical schools, had permanently set toward the laboratory method of education, whenever a suitable equipment could be had, and that the committee of equipment of the new organization proceeded, as a matter of course, to give it at the outset such an equipment as would make laboratory education practicable.

THE COTTON YARN PREPARATION DEPARTMENT.

It will be interesting to look in upon the cotton yarn preparation department, which plays an important part in its cotton manufacturing course, and to learn something of its equipment, its pupils, its teachers, its subjects of study, its series of lessons of the first year, now in progress, and the model for the lessons.

ITS EQUIPMENT.

In the large, well lighted room which has been assigned to this department may be found an excellent example of each of

the machines which are commonly used in the preparation of cotton yarn. They are arranged as they would be in an up-to-date cotton yarn manufactory. There are also separate constructions which exhibit mechanisms or "motions" which are also assembled with others in the complete machines, but which can be more readily studied in detail when they are removed from their usual environment and so mounted as to reveal their peculiarities of construction. Usual appliances have been provided for testing the cotton in the different stages of yarn production. Of very great value is the series of charts, in white lines upon a dead black surface, upon which are shown: first, the features of the processes or of the machines which are the subjects of study; second, the fundamental statements of fact or of principle with which the pupils become familiar; third, the illustrative examples which are worked out in detail; fourth, the problems which are to be solved.

ITS PUPILS.

There are now five classes of pupils in this department. The two night classes are composed of men, most of whom are regularly employed throughout the day in Lowell cotton mills, and who desire to acquire the greater competency in their business which they may gain through the medium of the school.

Two of the day classes are composed of men who have come from Mississippi, Georgia, North Carolina, New Hampshire and Massachusetts. The Massachusetts pupils in these day classes come from Fall River, New Bedford, Worcester, Boston, Waltham, Andover, Lawrence and Lowell. These men propose to devote their entire time for three years to the work of the school. They vary not a little in the degree of their preparation, but all have arrived at, and some have far passed, a certain minimum standard of attainment which is required of all who are admitted to the department.

One night and one day class entered about February 1, 1896. Another night and another day class entered about October 1, 1897.

A third day class entered about July 1, 1897, as a "summer school," intending to utilize the enforced leisure of the then prevalent, now happily disappearing, business depression. So gratifying has been their progress that, notwithstanding the passing of the summer and the revival of business, the class still continues its work in the school. Its members are nearly all employees of the Lowell Machine Shop — overseers, skilled mechanics, draughtsmen — a serious, intelligent, earnest, company. To but very few of these is the course of study utilitarian. To almost all of them it is a broadening of view.

There are in all eighty-eight pupils in this department of the school.

ITS TEACHERS.

Mr. CHRISTOPHER P. BROOKS, who has recently addressed this Association, is, as is well known, the Director of the Lowell Textile School. The principal teacher in this department is Mr. CHARLES C. HEDRICK, who for the past eighteen years has been a trusted employee in the draughtsman's division of the Lowell Machine Shop, where he has had a wide range of experience as a draughtsman, designer, and mill engfneer, and where his excellent personal qualities have won for him the respect and friendship of his employers and associates. His assistant is Mr. HENRY MCDERMOTT, a skilled mechanic, who has had long experience in the mill in the erection, adjustment, and use of machines such as those of which he now has the care.

ITS SUBJECTS OF STUDY.

These all relate to the processes for producing cotton yarn or to the machines in which such processes are conducted. They are sub-divisions of the broader subject of mechanics, which is a sub-division of the still broader subject of physics.

ITS SERIES OF LESSONS FOR THE FIRST YEAR

is designed to permit the interested pupil to discover by his own

investigations under skilful guidance: the nature and order of the processes for producing cotton yarn and how to conduct them; the nature of the machines for making cotton yarn and the fundamental facts, principles, and calculations which one needs to understand, if he is to adjust and to use them intelligently. The order in which the questions of the series are taken up is that of the processes to which the cotton is subjected as it passes from its tangle in the bale to its place upon the weaver's cop or beam or upon the bobbin or the cone of the knitting machine. The machines which are particularly considered are: the automatic-feeder, the opener-picker, the finisher-picker, the travelling-flat-card, the stationary-flat-card, the sliver-lap machine, the ribbon-lapper, the comber, the railway-head, the drawing-frame, the slubber, the intermediate fly-frame, the fine fly-frame, the speeder, the ring-spinning-frame, the mule, the spooler, the warper, and the slasher.

THE MODEL FOR THE LESSONS.

The instructor selects for a lesson a subject which is sharply defined, clearly cut, and distinctly separated from the subjects of other lessons. The subject is usually either a process or a mechanism. By isolating it from related or accessory processes or mechanisms he prepares the way for the conception of it by the pupil in a clear and distinct idea. Throughout the whole of the lesson, including its review, he directs the attention of the pupil to this distinctly isolated subject and guards against the diversion of his attention to any other matter. The part of the instructor, in the lesson, is that of a skilful director and supervisor of the work of the pupils of his class. As in the intense blackness of a dark night, an electric search-light directs and fastens the attention of the on-looker upon every detail of the escaping boat, which alone it illumines, so the instructor directs and fastens the attention of each pupil, concentrates the combined attention of his entire class, upon the process or mechanism which is the subject of the lesson. Let us observe them engaged in a model lesson. The pupils have assembled in their

comfortable seats. The instructor unrolls the chart for the lesson of the day. Each pupil studies and then copies into his note-book, the drawing, the writing, the calculations, the data, which he finds upon the chart. At intervals, during the copying, he stops that he may more precisely appreciate the process, the shapes, the inter-relations, the functions of parts, and their mode of operation. When the copying has been completed, he leaves his seat and going to the machine to which the chart pertains, identifies and continues his study of the process, the parts and their mode of operation. This period furnishes the best opportunity of the lesson for questioning either instructor as to any point which the pupil has failed to work out to his own satisfaction. In the note-book of the wise pupil are promptly written the results of his own observations, discoveries, questionings. Soon, the last pupil has completed his copy, the hum of the electric motor is heard, the operation of the machine is witnessed, and the pupils in turn take the place of the usual operative in performing some act of dexterity or skill which relates to the lesson.

While the pupils are studying the chart and the machine, the eye and the mind of the instructor is always upon them. His mind is as free as is possible from their subject of study. They are investigating a process or mechanism, which is a subject of study. He is investigating the characteristics of individual pupils. The most important examination of the notes of each pupil has the discovery of his characteristics chiefly in view. To understand and to mould these characteristics is his most important work. To attempt to mould without thoroughly understanding them would be folly. Said a wise manager, whose mill roof was being laid, of the contractor who was doing the work, "His foreman drives as many nails as any of his men. Unless he sends someone here, who will keep his hands in his pockets, there will be a big bill for him or for me to pay." Somewhere in the twenty-four hours, the teacher must have time, must have leisure, to think of, to influence, the characteristics of the individual pupil or the pupil's best capa-

bilities will not be developed and will be lost to the world. Preferably, just before the taking up of a new subject comes the lesson in review. Preferably, by quizzing the teacher draws out of the pupils the whole story which the lesson was intended to teach. If a pupil has drawn a wrong inference, wise questioning will set him right. More by quizzing than by statement, but certainly somehow, the whole story of the lesson is correctly told in the review. The wise pupil revises his notes as the quizzing proceeds. Then all pass to a new lesson and to a new subject.

THE CAUSE OF THIS DEPARTMENT.

It is well for this School and for its future that it had as a member of its initial board of trustees and of its committee of equipment a man of iron determination and of large acquaintance with young men and with the manufacturers of the entire country and their needs. The local manager of the largest American manufactory of textile machinery, he was well acquainted with the difficulties which are experienced by young men who desire to enter the textile industries but who, having completed their studies, lack the practical acquaintance with textile matters which will give to such of them as are without friends an introduction into the business. He was equally well acquainted with the annoyance to the mill manager and with the damage to his business which results from the necessary employment of the best available, but incompetent, subordinates in mills all over America in which cotton yarn is an element of the manufacture. He determined, through the not yet created instrumentality of the cotton yarn preparation department of the school, to qualify such young men and thus to bring them, the mill managers, and their business together. His determination settled the question. He secured the co-operation of his committee consisting of Mr. ALVIN S. LYON, chairman, Mr. EDWARD W. THOMAS, and himself, and of the President of the Trustees, Mr. ALEXANDER G. CUMNOCK, and a vote by the Trustees of full power for his committee. He secured

as gifts, from the KITSON MACHINE COMPANY of Lowell, the feeder and the pickers; from the MASON MACHINE WORKS of Taunton, the sliver-lap-machine, the ribbon-lapper, and the comber; from Mr. T. C. ENTWISTLE of Lowell, the accessory card-grinders; from Mr. W. W. CARY of Lowell, shafting and hangers; and from the LOWELL MACHINE SHOP of Lowell, all of the remainder of the magnificent machinery of instruction of this department, amounting in value to thousands of dollars. Not content with this, he has maintained a continuous and active interest in the practical success of the work of instruction. The entire LOWELL MACHINE SHOP, the organization of which he is the local executive, has caught the spirit of the undertaking and has united with him, Mr. CHARLES L. HILDRETH, in the endeavor to ensure its success. That so valuable a man as Mr. HEDRICK, one so familiar with the "trade secrets" of the organization, should have been released to the school as an instructor, is one of the proofs. There is no reasonable request, which is made of this organization by this department, which is not granted at once without cost.

WHAT SHOULD A YOUNG MAN KNOW?

Once, while revising a course of study for mechanical engineers, I called upon a number of prominent mill managers and put to them the question, "If you could decide what a young man should know, after four years of preparation to enter your employ as a mechanical engineer, what would you have him know?" One replied, "I should not care what he knew. I should take him into my mill, and give him a problem to work out which he doubtless had never seen before. If he should solve it with intelligence and success, I should keep him. If not, I should not keep him two days."

THE LOWELL TEXTILE SCHOOL AS A SCHOOL.—AS A TEXTILE SCHOOL.

The fundamental purpose of the Lowell Textile School is the promotion of manufactures, and very much to this purpose is

expected of the best men who shall graduate after having gathered the full preparation which the school can give. But, more than anything in the way of knowledge of textiles, diploma, or degree, the personal characteristics of the graduate student will determine the extent to which he will be capable of promoting manufactures. Is he well qualified by nature? Is he disciplined? Are his powers of body and mind and spirit under his complete control? Has he a right purpose? Does he shun alcohol, tobacco, and other narcotics, sensuality, and profanity? Has he physique, brains, endurance, forethought, judgment, cordiality, courtesy, common sense, good taste, breadth of view, push, dash, persistence, industry, system, integrity, conscience, tact, energy, vim, will-power? Has the school caused the finest characteristics of manliness, which are the most valuable of scholarly attainments, to develop and ripen, while yet the mind is intent upon fibres and fabrics, colors and chemicals, machines and processes, drawings and designs, books and pupils, teachers and trustees? The Lowell Textile School will be good as a school, to the extent that it exercises a forceful and beneficent influence in the making of men and women. It will be good as a textile school, to the extent that it influences the bounding life of an excellent, intelligent and well equipped manhood and womanhood to devote itself to the promotion of textile manufactures.

From "The Future of England", in "The Crown of Wild Olives".

By John Ruskin, M.A.

Education does not mean teaching people to know what they do not know. It means teaching them to behave as they do not behave. . . . It is not teaching youth . . . . the shapes of letters and the tricks of numbers; and then leaving them to turn their arithmetic to roguery, and their literature to lust. It is, on the contrary, training them into the perfect exercise and kingly continence of their bodies and souls. It is a painful, continual, and difficult work; to be done by kindness, by watching, by warning, by precept, and by praise,—but above all—by example.

Extracts from "Wanted — A Man", in "Architects of Fate."

By Orison Swett Marden.

"Wanted: men:
Not systems fit and wise,
Not faiths with rigid eyes,
Not wealth in mountain piles,
Not power with gracious smiles,
Not even the potent pen;
Wanted: men."

Run ye to and fro through the streets of Jerusalem, and see now, and know, and seek in the broad places thereof, if ye can find a man.—*Jeremiah.*

Wanted, a man who is larger than his calling, who considers it a low estimate of his occupation to value it merely as a means of getting a living. Wanted, a man who sees self-development, education and culture, discipline and drill, character and manhood in his occupation.

God calls a man to be upright and pure and generous, but He also calls him to be intelligent and skilful and strong and brave.

The world wants a man who is educated all over; whose nerves are brought to their acutest sensibility; whose brain is cultured, keen, incisive, penetrating, broad, liberal, deep; whose hands are deft; whose eyes are alert, sensitive, microscopic; whose heart is tender, broad, magnanimous, true.

Rousseau, in his celebrated essay on education, says: "According to the order of nature, men being equal, their common vocation is the profession of humanity; and whoever is well educated to discharge the duties of a man cannot be badly prepared to fill any of those offices that have a relation to him. It matters little to me whether my pupil be designed for the army, the pulpit, or the bar. Nature has destined us to the offices of human life antecedent to our destination concerning society. To live is the profession I would teach him. When I have done with him, it is true he will be neither a soldier, a lawyer, nor a divine. *Let him first be a man.* Fortune may remove him from

one rank to another as she pleases, he will be always found in his place".

MONTAIGNE says our work is not to train a soul by itself alone, nor a body by itself alone, but to train a man.

One great need of the world today is for men and women who are good animals. To endure the strain of our concentrated civilization, the coming man and woman must have an excess of animal spirits. They must have a robustness of health.

It is a sad sight to see thousands of students graduated every year from our grand institutions, whose object is to make stalwart, independent, self-supporting men, turned out into the world saplings instead of stalwart oaks, "memory-glands" instead of brainy men, helpless instead of self-supporting, sickly instead of robust, weak instead of strong, leaning instead of erect. "So many promising youths, and never a finished man!"

The first requisite of all education and discipline should be man-timber. Tough timber must come from well grown, sturdy trees. Such wood can be turned into a mast, can be fashioned into a piano or an exquisite carving. But it must become timber first. Time and patience develop the sapling into the tree. So through discipline, education, experience, the sapling child is developed into hardy mental, moral, physical timber.

To have done no man a wrong; to have put your signature to no paper to which the purest angel in heaven might not have been an attesting witness; to walk and live, unseduced, within arm's length of what is not your own, with nothing between your desire and its gratification but the invisible law of rectitude —*this is to be a man.*

"He that to such a height hath built his mind,
And reared the dwelling of his thought so strong
As neither fear nor hope can shake the frame
Of his resolved powers; nor all the wind
Of vanity or malice pierce to wrong
His settled peace, or to disturb the same;
What a fair seat hath he; from whence he may
The boundless wastes and wilds of man survey."

[*Lines found in one of the books of Beecher's library.*]

WAITING.

How gloomy this silence, oppressive ;
How weary my vigil would be,
If I were not waiting and watching,
And longing and sighing for thee.

'Tis here in my vine-covered window,
I strive through the darkness to peer,
For the clock in the steeple is chiming
The hour that he should appear.

The curtains of night slowly lifting,
The golden moon gleams through the trees ;
I start. Do I not hear a footfall?
But no ; 'tis the cool perfumed breeze.

Through my veins the hot blood swiftly surges ;
My heart beats a noisy tattoo ;
And I tremble, I'm nervous, excited,
Has he failed me? The time 's overdue!

I lean far out in the shadows ;
Then silently smother a cheer,
And gleefully grab at the coal-hod,
For at last that old tom cat is here.

ORMSBY A. COURT.

Lowell Textile Journal.

IS ART OF VALUE IN TEXTILES?

By VESPER SINCLAIR GEORGE.

THE desire for decoration is an instinct in the human race as truly as the desire for food, or warmth, or amusement.

From the earliest time to the present day, mankind has taken delight in decorating everything that comes to his hand.

Before he had any utensils upon which to use his inborn talents, he embellished his body, by tattooing his face and limbs; and I regret to say that the savage used better design in the motives with which he decorated his face than is manifest today on a large part of the decoration on our furniture and textiles.

The reason for this is simply that the savage recognized the limitation of design and forbore to pass beyond. While in this age of over-developed appetite, nothing satisfies but for a short period, and there is an ever-increasing and unwholesome demand for something new.

It would seem that it is better that it should be new, than that it should be good.

From the earliest time, the artist of every tribe, of every village, was looked up to as a superior being. He was allowed to pursue his art, and in exchange for his work he was brought the choicest viands, and the best robes. He was exempt from the duties of war, and peace and prosperity were his.

Even today when competition is so close, and every available force has to be utilized to make anything a success, the artist figures largely in every branch of applied art.

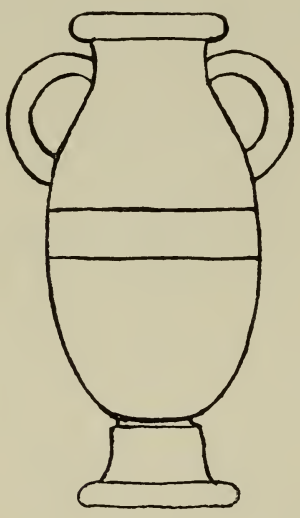
The salaries paid them, in so many lines of business, is sufficient testimony of their commercial value.

What was true of art, eight hundred or a thousand years ago, is true to-day.

Every man who wishes, cannot be an artist (at least a superior one). They are comparatively rare, hence they are proportionately in demand, and likewise their artistic products.

Why were the vases of the Greeks sought and valued so highly?

FIG-1



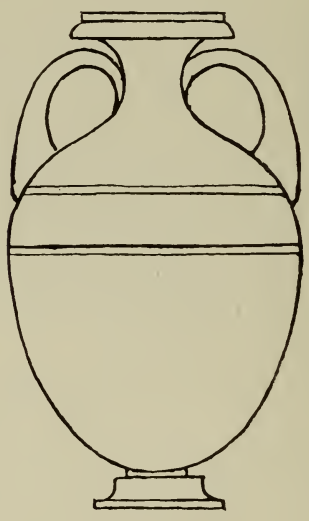
In figure 2, you may see the lines of a Greek vase. Fig. 1 illustrates a vase made from the same material, the same number of divisions, handles, etc., are used; yet no one would hesitate to say which is the better of the two. It is the knowledge and skill of the artist that makes fig. 2 superior to fig. 1.

The buyers appreciated the beauty of contour and simple design in the Greek vases and they must be had at any price.

The arms and textiles of the Orient have always been in demand, and simply because their artistic value has been recognized and sought for.

Good decoration in anything is bound sooner or later to raise that particular thing above the others of its class, and it will bring more in any market in the world.

FIG-2



GREEK VASE

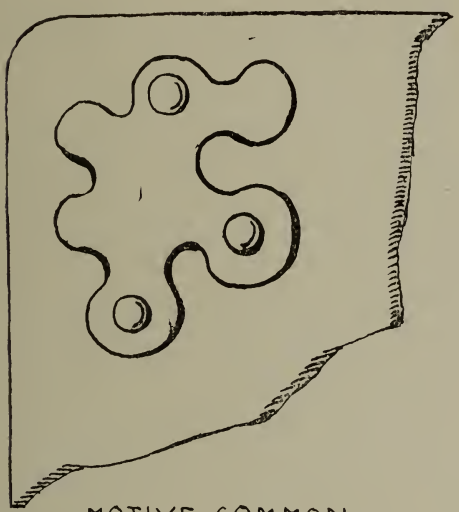
While that is true of everything, it is especially true of textile fabrics.

From the earliest history of the world the craftsmen who could manufacture the best fabrics, weap-

ons, etc., first in texture, second in design, were the ones who became rich, and whose productions led the markets.

The nature of the race has not changed; the desire for the beautiful is with us still.

Sometimes necessity compels us to purchase inferior articles, but



MOTIVE COMMON TO MUCH OF OUR MODERN FURNITURE.

when we have ample money for our purchase, we are glad to avail ourselves of the best the market produces.

It seems to me that it is not impossible that the competition with the South (of which we hear so much), might be removed, at least as far as fabrics with designs were concerned, if the manufacturers of the North would make goods of such superior design that they could outsell the South by reason of their beauty and elegance.

Another question which always arises in this connection and one not so easy to settle, is, "What is the standard of good design?"

The artist says, "Merit;" the manufacturer says, "Selling quality."

They should, of course, be the same, the merit ought to be the selling quality.

For obvious reasons I am not going to give a short method of quickly adjusting this matter.

It must be remedied by slow degrees, however.

I would like to make some suggestions concerning it, which it seems to me would help solve a difficult problem.

I believe the manufacturer, as a general thing, is willing to put any design, good or otherwise, upon his productions, so long as he meets the wants of the purchasers. In other words, he is in the business to manufacture a saleable article for money.

On the other hand, the larger class of purchasers have poor taste and generally prefer gaudy to meritorious designs.

As the manufacturer can not produce an article for the few, the minor class, whose taste may be above the tawdry goods, is com-

pelled either to buy the bad or use plain unfigured material.

However, there is no doubt that a large number of the class of persons who buy the unartistic productions, are influenced in their purchases by the opinion of the salesman.

FACE DECORATION
NEW ZEALAND

His "It is the latest thing" (as if being late was a merit), or, "It is all the rage this year," is frequently sufficient to decide the customer in favor of these goods. The object of the salesman is only to sell the goods and his judgment of design is often a little less good than that of the purchaser.

Therefore it is obvious that if we want a better standard of design in the fabrics, as well as in furniture and many other things, we must either raise the standard of appreciation in the purchaser or salesman.

The latter class being the smaller, it would seem that through them the object might be best attained.

I believe, however, that in the taste of the people alone can this matter be entirely remedied.

The times are changing, the standard of the people is being raised and a demand for better design is slowly but surely increasing.

I feel sure that the manufacturers will always keep up to the demands of the masses.

One thing could, I believe, greatly help the matter, if the artists who made the designs were properly trained, and were familiar with the best work done in the past, by workmen who worked for love of their labor alone, they would influence the manufacturers to produce designs not unworthy the name, and if only good designs were placed in the market, surely the purchaser would buy them, and the salesman would as willingly say, and much more truthfully, "A superior article madam, the latest thing."

AMERICAN COTTON MACHINERY

For the Preparation and Treatment of Fibres and the Spinning of Yarns and Threads.

WHAT IT IS AND HOW TO USE IT.

By CHARLES CLIFTON HEDRICK,
Principal of the Cotton Spinning Department of the Lowell Textile School.

REVOLVING FLAT CARD.

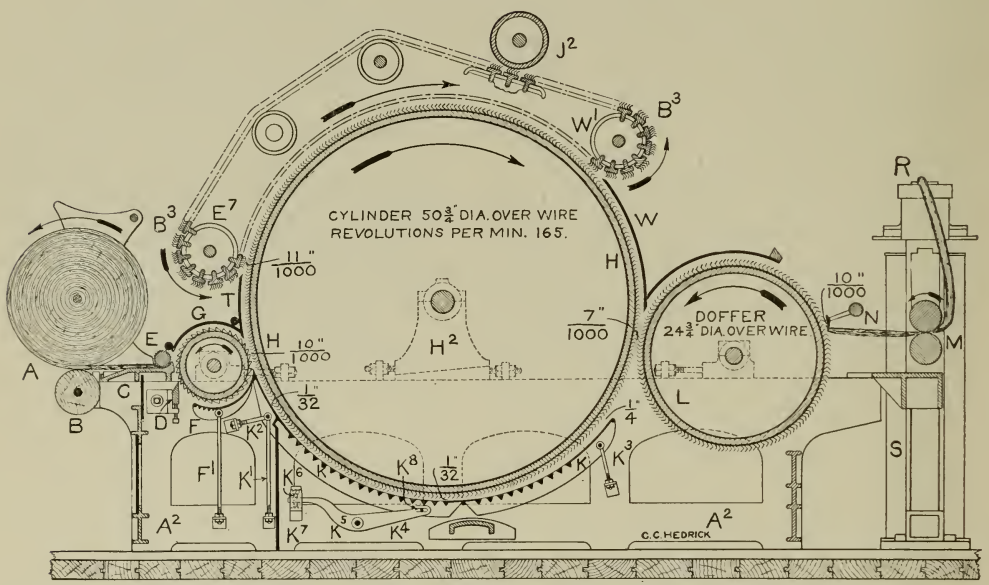
Chapter III.

After the cotton has passed through the opening and cleaning process, there still remains a considerable amount of leaf, sand, particles of seed, and small clusters of unripe fibres which must be removed before it can be properly spun into yarn. If we carefully examine a lap, from the finisher picker, we will see that, in addition to the impurities, the fibres lie in different directions and it is necessary to card or comb them to both straighten and clean them.

The cotton card, like all other machines used in cotton spinning, has grown from a very primitive form until practically only two styles are in use at the present day, the revolving flat card and the stationary flat card. Of these two styles the revolving card will be first considered, and a thorough examination given, which will be fully illustrated. A sectional elevation is shown in Figure 28.

The lap, A, from the finisher picker, which is placed in the lap stands, rests upon the lap roll, B, by which it is slowly revolved, the surface speed of the lap roll being just sufficient to unwind the lap at the same speed as it is received by the feed roll. The sheet of cotton then passes forward on the feed plate, C, and under the feed roll, E; in passing up over the curved part, or nose of the feed plate, the fibres come in contact with the teeth of the leader, or licker-in, G. The action of the leader is twofold, that of removing the dirt and combing or

straightening the fibres. When the teeth of the leader (the surface speed of which is about 1050 feet per minute) strike the fibres, the force of the blow strikes down and partially removes the dirt. The fibres, which have then advanced far enough beyond the bite of the feed roll, are removed and carried around by the leader, while those of the mote knife, D. This knife also aids in removing the dirt, etc., which has been only partially struck out of the lap by the teeth of the leader. Directly under the leader is a screen or grid, F, called the leader screen. The part of the screen with which the fibres first come in contact consists of a series of bars running across from



SECTIONAL ELEVATION OF LOWELL MACHINE SHOP REVOLVING FLAT CARD

Fig. 28.

which are held by the feed roll are combed and straightened. The cotton thus receives a very effective cleaning, more dirt being removed at this point than in any part of the card. By being carried around by the leader, the fibres are drawn over the top edge side to side of the card, the rest of the screen from the last bar to a point where it is hinged to the cylinder screen, is perforated with small holes. The object of this screen is to prevent the cotton from leaving the leader, and to allow the foreign substances, which

being heavier are thrown out by centrifugal force, to drop through the perforations. The fibres, which have been brought around by the leader, are now taken up by cylinder, H, the surface velocity of which is a little more than twice that of the leader. The wire teeth, or card clothing, of the cylinder, are much finer than that of the leader and, as both surfaces run in the same direction, the fibres are very readily stripped from the more thoroughly cleaned and straightened. The speed of the cylinder plays an important part in this operation. If the fibres are short they will be removed by the flats, but if they are sufficiently long they will hold to the cylinder and be combed by them. The fibres are now transferred from the cylinder to the doffer. Just how this is done may seem perplexing to many, but if we stop to consider a moment this operation will be

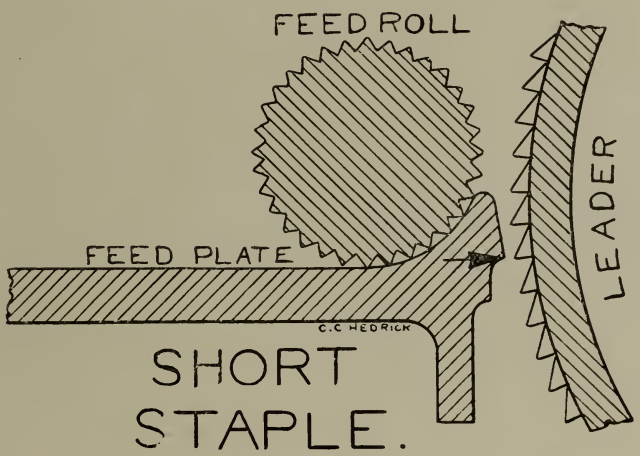


Fig. 29

teeth of the leader and carried forward under the flats, B^3, to the doffer, L. The flats, which are faced with card clothing, similar to that of the cylinder, embrace a little more than one third of its circumference and travel slowly in the same direction as the cylinder. As the fibres are carried beneath each successive flat, they become found very simple. Although the surfaces of the cylinder and doffer run in the same direction, the clothing of each is bent at a different angle, the doffer clothing presenting a series of hooks upon which the fibres are caught and withdrawn from the cylinder. If we closely examine the cylinder it will be seen that many of the fibres

stand out from its surface, not in straight lines parallel with its circumference, but in a loosely tangled mass, which is effected partially by centrifugal force, but more by the natural irregular disposition of the cotton; and, as most of the fibres are carried around by the cylinder a great many times before they are transferred to the doffer, their repeated passing beneath the flats changes their position, which finally results in their withdrawal from the cylinder; then, too, the fibres cross and re-cross each other, so the withdrawal of one or more easily effects others.

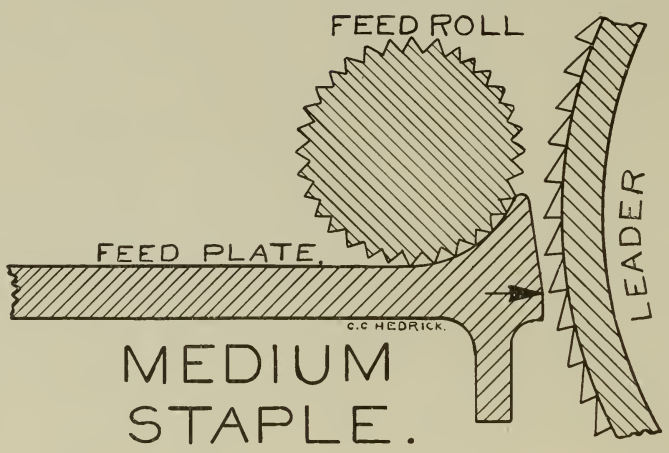


Fig. 30.

Beneath the cylinder is the cylinder screen, K, which extends from the leader screen almost to the doffer and which is made in two parts hinged about in the centre. Each half, for the greater part of its length, consists of a series of bars running from side to side. If no screen is used under the cylinder its high surface velocity (about 2150 feet per minute) would cause the fibres to stanp out and finally become detached, but with a screen under the cylinder, this cannot happen, while the heavier impurities, which are thrown out by centrifugal force, fall between the bars.

The doffer, which is $24\frac{3}{4}$ inches in diameter outside of the wire clothing, runs at a very slow speed, not over 20 revolutions per minute, the fibres are consequently deposited on its surface in a more condensed form than on the cylinder, and they are carried around and combed off by the doffer comb, N, which draws the fibres from

the points of the teeth, and, as they lie very loosely upon the surface of the doffer, they are easily detached. The fleece or web is now passed between the calender rolls, M, by which it is condensed into a soft, rope-like mass, called sliver. From here it is drawn upwards and enters the coiler, R, by which it is coiled very compactly into the can, S.

30, is for medium length cotton, the distance from the bite of the roll to the lower edge of the plate, being greater than in Fig. 29, and the nose sharper. The last plate, Fig. 31, is for long staple, Sea Island, or Egyptian cotton, and the distance from bite of feed roll to lower edge of the plate, is greater than either of the others, and the nose still more pointed. In

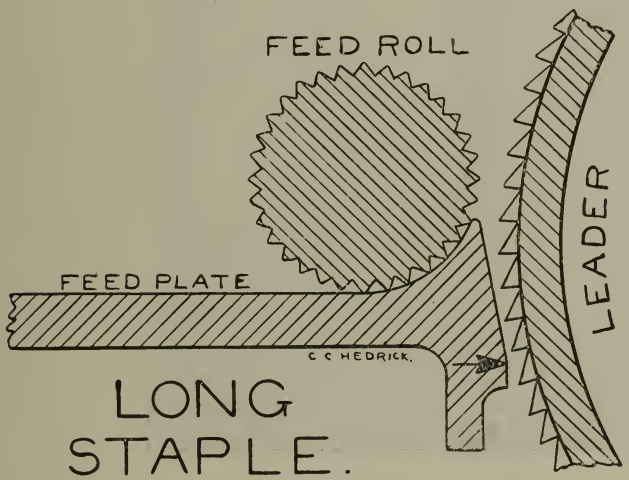


Fig. 31.

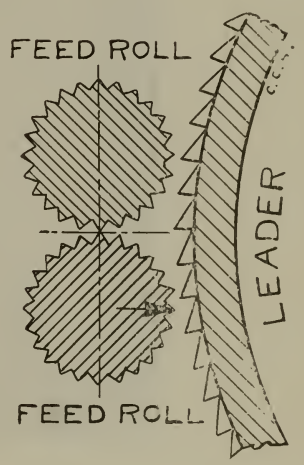


Fig. 32.

The operation of carding, having been considered in general, the details of the card will now be described, starting with the feed plate. Figure 29 shows a feed plate which is used for short staple cotton. The distance from the bite of the feed roll to the lower edge of the face of the feed plate, which is indicated by an arrow, is quite short. The next one, Fig.

all cases this distance should be slightly more (from $\frac{1}{16}$ to $\frac{1}{8}$ of an inch) than the length of the staple being worked, otherwise the fibres will be broken, or shortened by the leader teeth trying to take them away before they are sufficiently liberated from the bite of the feed roll. The angle of the face of the feed plate should be such as to cause the teeth of the

leader to comb the fibres for at least one-half of their length, before they become detached.

Figure 32 shows the method which was used for feeding the card before the feed plate became generally adopted, and it may still be found on the old style stationary top cards.

any combing from the teeth of the leader, the cotton would thus be taken away and delivered to the cylinder in small tufts. Figure 33 shows a half tone of two sections of laps taken from cards. The section marked A is from a card provided with a feed plate, while B is taken from an old style

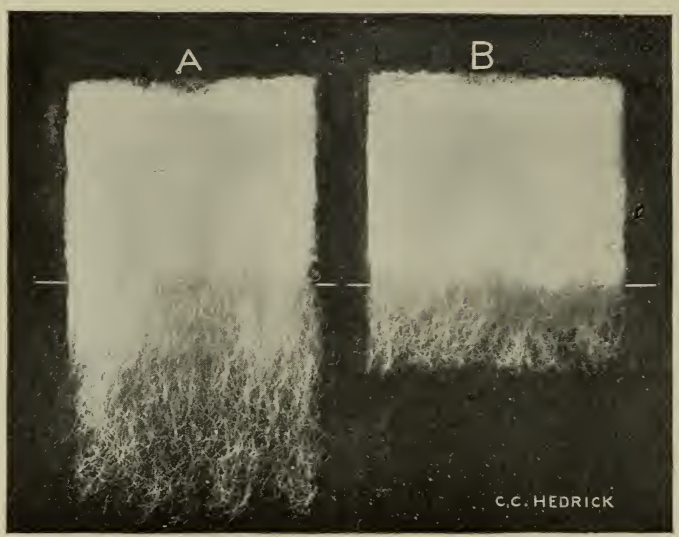


Fig. 33.

The feed rolls were about $1\frac{3}{8}$ inches in diameter, the cotton being carried forward between them to the leader or cylinder, some of the oldest style cards having no leader. The distance from the bite of the feed rolls to the point of contact with the leader, is about $1\frac{1}{8}$ inches and unless the fibres are at least $1\frac{1}{4}$ inches long, they would become detached from the bite of the rolls, before they had received

card with two feed rolls. The point where the fibres are liberated is indicated by a horizontal line and it will be seen that the fibres in section A are combed and cleaned for a greater portion of their length than those in B, which receive very little combing before they are taken away by the leader, many being broken or shortened by this method of feeding.

Figure 34 shows a section of the leader, the cylinder and the parts connected, also a section of a flat in relation to the cylinder. The mote knife, D, is adjusted in either direction, horizontally by moving the bracket D^1, by which it is attached to the leader shroud, and vertically by the screw D^2. The correct distance from the teeth of the leader may be very easily obtained and, as the leader shroud forms a bushing for the leader shaft, when the position of the leader is changed, the mote knife moves with it thus avoiding the necessity of re-setting. Over the leader is a steel cover, J, called the leader bonnet. At the point where this cover and the back plate, T, come together, is placed a round iron rod, P, covered with flannel. This rod serves as a fill-up piece, preventing the dust and short fibres from blowing out. Resting upon the feed roll and between it and the leader bonnet, is a rod, J, similar to the one just described. At this point the rod performs a double duty, preventing the dust and short fibres from blowing out, and acting as a clearer for the feed roll.

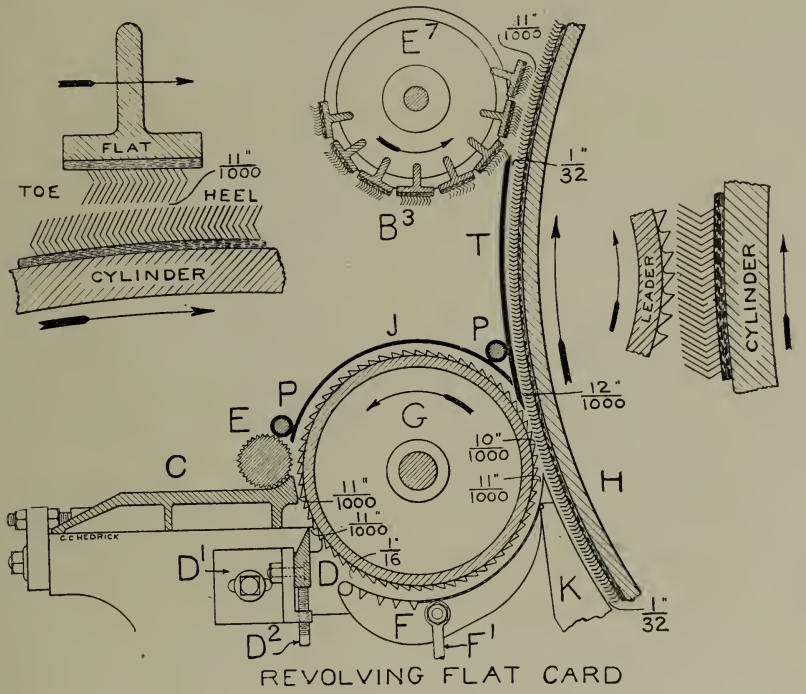


Fig. 34.

In the section of the flat and

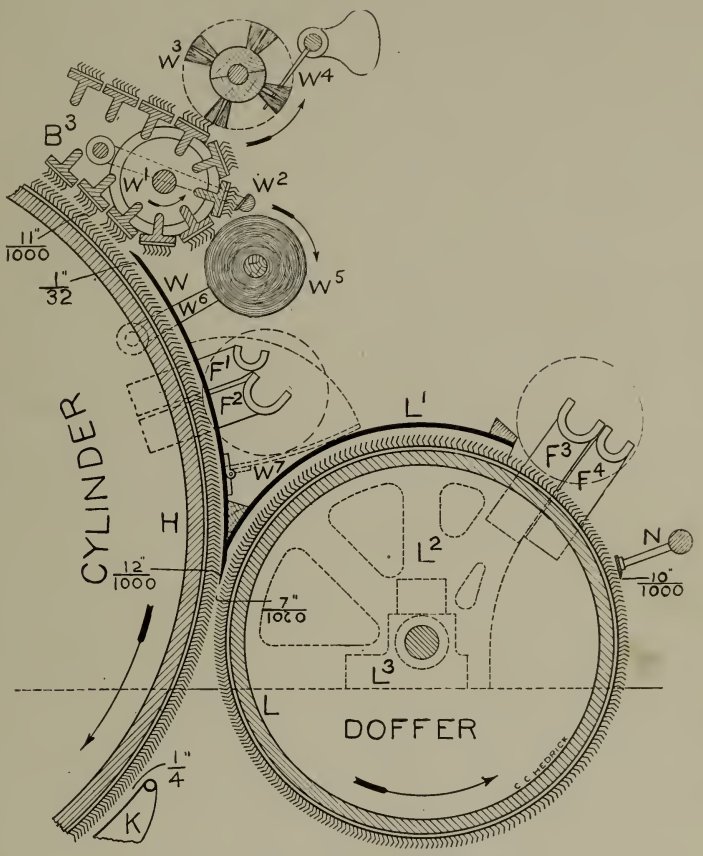
the cylinder, it will be seen that the space between the wire of the flat and cylinder, is greater at the toe, or point, where the cotton enters than at the heel where it leaves. By inclining the flat in this manner, the fibres receive combing from the greater portion of its wires, and as the fibres stand out, slightly, from the surface of the cylinder, by being gradually drawn into a small space, they are more easily dealt with than they would be if the flat were brought close at the toe.

A few words may now be said in regard to the settings of the various parts shown in Figure 34. The usual settings, although liable to a change under different conditions, are as follows: The distance of the feed plate and the mote knife from the leader is $\frac{11}{100}$ of an inch. The leader screen is set $\frac{11}{100}$ of an inch from the leader at the point where it is hinged to the cylinder screen. The nose of the screen with which the fibres first come in contact, is set from $\frac{1}{32}$ to $\frac{1}{8}$ of an inch from the leader, depending upon the condition of the cotton and the amount of fly it is desired to remove; this allows the fibres to be gradually drawn into a more compact space, and to present a more even sheet to the action of the teeth of the cylinder.

When it is required to use the cotton for a very fine grade of work, it is best to remove as much fly as possible at this point, rather than to permit it to fall out between the rolls of the drawing frame, and during other processes. This may be done by setting the nose of the screen close to the leader, but if set too close it is possible to remove much good cotton, thereby making too much waste. The setting depends upon the judgment of the carder. The screen may be adjusted by the rod, F, the lower end of which passes through a bracket, fastened to the side of the card. In setting the leader from the cylinder the guage $\frac{10}{100}$ is generally used. The back plate, T, which extends from the leader to the flats, is set about $\frac{12}{100}$ of an inch from the cylinder at its lower edge, at the upper edge the best results are attained by setting it $\frac{1}{32}$ of an inch from the cylinder, this allows the fibres to free themselves and stand out a little from the cylinder before they meet the flats.

By referring again to Fig. 28, it will be seen the cylinder screen is adjusted at the front part or nose by a rod K^3, while at the back, where it joins the leader screen, the vertical adjustment is obtained by a rod, K^1, while the

lateral movement, is governed by the rod, K^2. The centre of the screen is adjusted by the lever, K^4, which turns upon a stud, K^5, one end of the lever being connected to the screen by a pin, K^8, the other end being tapped to receive an adjusting screw, K^6, which is held between the projecting ears of a stand, K^7. The usual setting of the screen at the back, and the centre is about $\frac{1}{32}$ of an inch from the cylinder, but the front or nose is set away about $\frac{1}{4}$ of an inch. This allows the fibres to be gradually drawn between the screen and cylinder, which would otherwise be thrown off, if the screen were brought up close to the cylinder.



REVOLVING FLAT CARD

Fig. 35.

Figure 35 shows a partial section through the cylinder doffer and parts directly connected. The flats, B^3, pass around the front block, W^1, in the direction shown

by the arrow, the short fibres or strippings which adhere to them, being removed by the stripping comb, W^2; passing along towards the rear of the card, they are brushed clean by a revolving brush, W^3, called the stripping brush, which is itself cleaned by a stationary comb, W^4, called the stripping brush comb. Directly beneath the stripping comb is the strip roll, W^5. This consists of a wooden roll about $1\frac{1}{2}$ inches in diameter, covered with flannel and supported at either end by arms, W^6. As the flats pass around the front block the strippings, which are removed by the comb, are wound upon the roll, which revolves by being held lightly in contact with the flats.

It was formerly the custom to allow the strippings to drop upon the doffer cover in a loose mass when a sufficient amount had collected, this was removed. But with the strip roll, the strippings are wound in a neat and very compact form which can be very quickly removed, and by reason of being wound into a roll, instead of a loosely collected mass, the removal does not have to be performed so often.

Extending from the flats to the doffer is a polished steel cover, W, called the front or stripping plate. Upon the setting of this plate depends the removal of the short fibres or strippings from the flats. It is generally set, at its lower edge, about $\frac{12}{1000}$ of an inch from the cylinder and about $\frac{1}{32}$ of an inch at the top edge. If set close at the top edge the strippings would be removed from the flats by the cylinder, when they reach the edge of the plate, but if the plate is set away from the cylinder at its top edge, the strippings will cling to the plates and be combed off when they reach the stripping comb.

When it is necessary to grind or to strip the cylinder, the door, W^7, which is hinged to the front plate, can be turned down as shown by dotted lines.

Over the doffer is a cover, L^1, called the doffer bonnet, which is fastened to the doffer shroud, L^2, which in turn is fastened to the doffer bearing, L^3. The doffer is set about $\frac{7}{1000}$ of an inch from the cylinder and the doffer comb about $\frac{10}{1000}$ of an inch from the doffer.

"Fearful destitution up at the Klondike," said Biggs.

"Awful!" returned Wimbleton. "I'm told that a wooden-legged man up there had to chop his leg up into toothpicks."—*Harper's.*

THE LOWELL TEXTILE JOURNAL.

PUBLISHED MONTHLY
AT
No. 67 Middle Street, = Lowell, Mass.
BY
THE LOWELL TEXTILE JOURNAL COMPANY.

W. M. HASTINGS, Editor.
A. B. FELS, Treasurer,
E. D. Chase, Advertising Agent.

Entered at the Post-Office at Lowell as Second Class Mail Matter.

SUBSCRIPTION TERMS.

For one year, postage prepaid	$1.00
Single Copies	.10
For Sale at all Newsdealers	

Advertisements must be at the Journal Office before the twenty-fifth of each month for insertion that month.
Contributions may be sent to Editor of The Lowell Textile Journal, and will receive prompt attention.

EDITORIAL.

It is to be hoped that the proposition of establishing a sample warehouse on the Continent, for the display of American made goods, now being considered by the National Association of Manufacturers, may be speedily put into effect. It is a good, healthy idea, and should receive the commendation and support of every manufacturer in the United States.

The fact that to some of the goods in the German shops are attached the words, "American made," is good proof that our products are in demand; and the day may not be far distant when this sign will be as common as that other one, always before the eye of the American tourist, "English spoken."

. . .

The cool reception with which the Boston conference met in Lowell at the hands of the mule spinners, voices the sentiments of the operatives here pretty effectually. That and the return to work of the operatives of the King Phillip Mills, seem to indicate the turning point of the strike. The end of this labor trouble is now close at hand.

. . .

The spinners of this country have no great reason to be proud of their English brethren, when the latter propose to place no difficulties in the way of American manufacturers who wish to buy yarn of their making. Undoubtedly the English spinners know to what purpose their product is to be put, and this places them in a worse light here.

There is a certain fitness in all things, and unprejudiced people always admire those who are willing to stand by their own convictions.

. . .

We take great pleasure in congratulating the "Sun" on its phenomenal sale of February 13th, and the means by which it was at-

tained. The matter printed in regard to the personnel of the Textile School, is such a gross misfit as to be scarce worthy of notice. Persons who really know something about the school, are at first surprised in glancing over the article in question, but after finishing, the look changes to one of disgust, and the sheet is dropped gently into its proper place, the waste basket.

We would respectfully suggest that "Public Rights," and "A Citizen," combine forces and guess again.

. . .

The frequency with which the above mentioned letter is thrust into the faces of the patient citizens of Lowell, seems to argue that the writer has a fair-size bump of self-conceit, and likes to see his own writing in print, even though said writing does not happen to contain any truth on the subject discussed.

TEXTILE ORNAMENTATION.

By FENWICK UMPLEBY,
Headmaster of Woolen, Worsted, and Designing Departments of Lowell Textile School, Lowell, Mass.

These evangelists embellished their manuscripts and jewelry with all kinds of devices, and when we examine them we are astonished at their remarkable and extreme richness and the ingenuity that has been displayed in arranging the figures of the designs. Letters and fine arts began to revive in the west about the eighth century, mainly through the enterprising and enlightened spirit of the English and Irish missionaries and under the fostering care of Charlemagne, who established public schools in different parts of the Empire, and gave his royal encouragement to all the arts, sciences, and literature of his time. He sent to other countries where the sciences and handicrafts had not been so thoroughly extinguished, for teachers and professors to train his own people, and it was thus that English artistic works acquired a wide repute on the main land. St. Bernard (Abbot of Clairvaux), who lived in the twelfth century, was one of the greatest patrons of the arts and

sciences of his day, and he was himself highly skilled in nearly all the formative arts, and is also credited with having devoted careful study to the manufacture of Irish vases, and to the works of the English goldsmiths that found their way into the Imperial Courts.

Very soon after the conquest the productions of the English looms were called into demand, and consequently the textile manufacturer became very busy. English weavers, at this remote period, had made considerable advancement, and were not behind-hand in their embellishments and designs. The specimens of early English workmanship, which are to be seen in our public museums, bear testimony, and are proofs that we have, from a very early date, made garments, hangings and tapestries, and ornamented them with exquisite and ingenious designs; and the work and skill of the artificer were admired and prized by the nobility and peasant alike. We read that on great state occasions in England, ornamental fabrics and tapestries were exquisite for the adornment of the streets and palaces. Such fabrics have, from the remotest ages, been valued far and near. When any one possessed these textiles they preserved them with solemn care, and when the owner of them was preparing to leave this life, he would, on making his bequests, insert in his will to whom his favorite tapestries and clothing were to be given. Richard, Earl of Arundel, in 1392, willed "to his dear wife, the hangings of the hall, which were made in London of blue tapestry with red roses, and with the arms of my sons." The Lady of Bergavenny, after bequeathing her hulling of black, red and green to one friend, left to another, her best stained "hall". Matthew of Westminster, complaining of the ruin of our export trade in woolen goods in his time, assures us that with these goods England had formerly supplied the whole world. This statement should be accepted as a little exaggerated, for we must not take all the credit to ourselves for the advancement of the textile industries. No doubt, the woolen goods of Flanders would be sold whereever the sea or river would permit them to be conveyed. About 1380 Flanders was an open market for the traders of the world, and it is stated that merchants from seventeen kingdoms had their places of business in Bruges, besides the strangers who repaired thither from almost unknown countries; and this may be one reason why the Flemish weavers came over to

England, and brought their art of weaving amongst us, or it may have been the fault of the authorities who, levying a tax on the loom, provoked the weavers to leave their native country and take up their abode in England, during the reign of Edward III, who held out all manner of inducements, to settle in England. Fuller, writting on the offers held out to them, says: "There they should feed on fat beef and mutton, till nothing but their fullness should stint their stomachs, their beds should be good, and their bed-fellows better, seeing that the richest yeoman in England would not disdain to marry their daughters unto them, and such were the English beauties that the most envious foreigners could not but commend them." The occupation of woolen weavers, manufacturers or merchants, became honorable, and they were placed on the same footing as a landed proprietor. During this epoch, 1300, Bath, Worcester, Norwich, and other places, became famous for their woven productions, such as the commoner sorts of silks and cloths of wider breadth, specimens of which are to be seen in the Brooke collections; but at an earlier date, the English were noted for their needle work, a great quantity of which was produced in the nunneries. The skillful workmanship and elegance in design of these productions, may be judged of from many specimens now to be seen in South Kensington; the ingenuity of these ornamental textiles was of wide repute; they were admired at home and abroad, and foreigners especially were fain to be possessed of this beatiful English work. Matilda, wife of William the Conqueror, carried away from the Abbey of Abingdon, its richest vestments, and would not be put off with inferior ones. Among the copes reserved for the prelate's use in the Chapel of Charles, Duke of Bourgoyne, brother-in-law to John, Duke of Bedford, there was one of English work, very elaborately fraught with many figures. At home, also, we have abundant proof of the value set upon our productions, and upon the skill of the English artisan. In the issue Rolls, it is stated that "Henry III had a chasuble embroidered by Mabilia, of Bury St. Edmunds," and that Edward II "paid a hundred marks to Rose, the wife of John de Bureford, a citizen and mercer in London, for a choir cope of English embroidery, and which was to be sent to the Pope as an offering from the Queen." There are very few people of the present

day that have the faintest idea of the patience, skill, money, ingenuity and length of time that must have been bestowed upon these ancient pieces of ornamental fabrics. We have considerable testimony and sufficient contemporary evidence to show that this extraordinary craving for gorgeous fabrics, and that the ability and skill to produce them, were not limited to these islands, but that other nations had their highly artistic and clever workmen. Thus we read that at Glovanni and Florence, there were made certain rich vestments (after the design of the works of Antonio Pollennolo, who died 1498), all of gold wove velvet, with pile upon pile, each woven of one entire piece and without seam, embroidered with the most subtle mastery of that art by Paola da Verona, a man most eminent in his calling, and of imcomparable ingenuity, and that this said vestment took twenty-six years for its completion."

There are many other textiles which it is not our intention to dwell upon, but in passing we may say that the word textile includes all kinds of stuffs, no matter what its material, that fabrics are made from, whether from the animal, vegetable or mineral kingdoms: —wool, hair, flax, hemp, fibrous filaments drawn from plants and flowers, and the coatings of pods, such as cotton, gold, silver, and last, not least, paper, a material used in other countries, and from which garments are made. Shoes and gloves we beg to pass over with very few remarks, but nevertheless they have not played a trivial part in the ornamentation of days gone by. We learn from the York wills that ceremonial shoes, worn by bishops, were a part of the Episcopal attire. They were made of velvet, or damask, or strong linen embroidered. Among the New Year's presents to Queen Mary, was a pair of gloves embroidered with gold. Shakespeare, after making Antolycus chant the praises of

> "Lawns white as driven snow,
> Cyprus black as ere was crow,
> Gloves as sweet as damask rose,"

puts the following into the mouth of the Shepherdess:

"Come, you promised me a tawdy lac and a pair of sweet gloves."

Quilts have also had a conspicuous part to play in adorning the habitations of our forefathers, and some of them were highly prized. We all know how our ancestors collected and preserved small remnants of fabrics and made beautiful patchwork

quilts, and these they have handed down from generation to generation. On some of these coverings, at each corner, are figures representing the four evangelists, reminding us of the old nursery rhyme:

Matthew, Mark, Luke and John,
Bless the bed that I lie on.

Robes for baptism were looked upon as sacred garments and ornamented in the most sumptuous fashion. Shakespeare mentions them in the Winter's Tale, "Here's a sight for thee, a bearing cloth for a squire's child."

Talks with Beginners in Designing.

One of the first duties that a young man encounters upon entering the designing room of a mill, is known as *cloth inspection* or *picking out.* Frequently a superintendent will receive an order for a certain number of pieces of cloth, a sample of which is forwarded at the time. Generally some slight changes are to be made in the character of the goods required, but often no change is necessary.

When the piece has been decided upon, the designer goes to work to see if he can make sufficient profit for the mill with the price given, and also if the cloth which he turns out will be up to the standard of requirements set by the ordering firm. It is in this reproduction of the goods that cloth dissection comes into play. The designer receives the sample and proceeds to take from it the design from which it was woven. The method is simple—

Take, for instance, a small piece of cotton or worsted dress goods, say four inches square, one with not much figure preferred; pull out enough of the filling threads to leave a half inch of warp threads exposed. Now separate one of the filling threads so that it lies about a fourth an inch from its fellows, and still is a fourth inch from the end of the warp. Observe the warp threads closely and it will be seen that some of them pass over and some under this cross thread. Lay a piece of designing paper on the table on which this work is being done, and

with a sharp pencil point or needle, separate the first warp thread on the left side of the sample of the design paper at the top as in Fig. 2. The next thread in Fig. 1, goes over the filling thread;

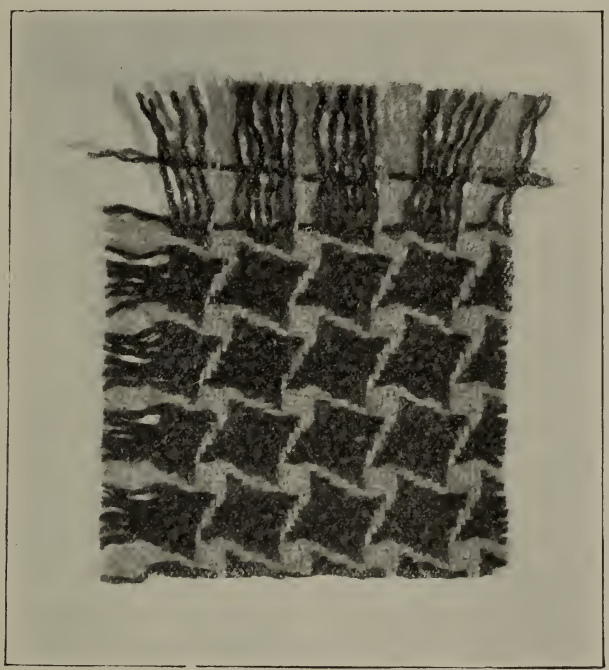


Fig. 1.

where it goes underneath the filling thread (Fig. 1). Leave the first square vacant on the left side therefore, fill in the next square, and proceed to the third, which goes under, so leave the third

square vacant. The next three warp threads go over, and are indicated in the next squares with black. In this manner go across the warp, until all the threads that pass over or under this filling thread have been accounted for on the paper with either a black or a white square. If this line of squares is observed closely, a certain regularity is seen. The first three threads are, on paper, white, black and white. The next three are black, and so forth. Now look at the 13th, 14th and 15th squares. They are also white, black white, and the next three black, exactly as in the beginning. Also on the 25th, 26th and 27th this same set appears. It proves conclusively that the design repeats itself in the warp on twelve threads.

Now remove the filling thread just used and pull another one into the place the first occupied. As it is known that the repeat is on twelve, it is necessary to carry the dissection only two or three warp threads beyond that number, to see that no mistake has been made.

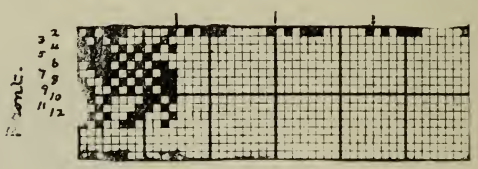


Fig. 2.

That is threads 13, 14 and 15, must always occupy the same relative position as threads 1, 2 and 3.

Continue to mark down and pull out each filling thread, until it is found that one exactly matches the thread represented at the top of the paper. The next line must match the second filling thread, and so on. When several coincide thus, it is ample proof that the repeat in the filling has been reached, and also shows the extent in this direction of the design. In this case it is twelve threads in length as in width. The squares

at the top of the paper beginning with the 13, are, of course, of no value to the design after the repeat has been determined, and this also applies to the filling squares.

This whole process is known as cloth dissection, and on single cloths is most simple.

In the present instance, the design just completed, may be used directly as the chain draft; but in designs where some of the warp lines are similar to others, a chain draft is made as shown in a preceeding paper, thus reducing the pattern to a smaller number of harnesses. The word "front" is written on the left-hand side of the design. thus insuring its being placed on the loom correctly.

An important point in first looking over a cloth sample, is to determine which is warp and which filling. If a selvedge happens to be attached there is no question as to this, for the selvedge always runs in the direction of the warp. but as in almost every case there is no selvedge on the small piece of cloth given to the designer, he must find out by other means. One way is to compare several threads of warp with several threads of filling; those which show the heaviest creases made by the intersections of the cross threads, are from the filling, those most nearly straight, from the warp. Another way is to take one side of the sample firmly between the thumb and fore finger of one hand and the opposite side in like manner in the other hand, and pulling to test the amount of give and spring to the yarn. The set of threads which stretch the most, is the filling, the warp is firmer. After a little experience the difference can be told at a glance.

As the beginner often finds

some difficulty in correctly naming the different yarns used in cloth construction, the following rules may be used to advantage:

Cotton thread has scarcely any lustre and snaps apart suddenly in breaking. When burned it leaves a gray feathery ash.

Linen to the casual observer, greatly resembles cotton, but on closer examination it will be found that the fibre has some lustre, is harsher, and makes a smoother thread. That is, the fibre does not project from the thread as in cotton. When bleached it retains its purity of color for a longer time.

Silk on account of its fineness and lustre, requires no mention.

Woolen yarn is soft and matted. It is composed of short wool, spun in such manner as to have the fibres projecting from all parts of its surface. When burned it shrivles into a hard black substance, thus forming a marked contrast to the cotton ash.

Worsted yarn, although made entirely from wool, is utterly different from woolen. In the various processes through which the wool passes, all of the short fibre is extracted, leaving only the long wool. This makes a clear yarn, free from all the little matted bunches with which woolen yarn is rife.

Mohair is a silky, animal fibre, having a high lustre, and when spun has considerable elasticity. Any cloth which springs back to its original shape after being crumpled in the hand, is very apt to contain a fair proportion of mohair. Even with this slight mention, a careful person with some practice should find little difficulty in determining the different yarns used in our ordinary cloths.

M.

JUST OVER.

Me an' me frind McFee,
Huntin' fer work all day,
Whisht, but this huntin's a cod, say he,
Pulls be th' stuff, they say.
Work be th' divil, says he,
To get, he says, says he,
But af we kin only git a pull
We'll land a good job, ye'll see.

Unther a chistnut tree,
Shnoozed a man an' a jug.
Faith, here's our chance fer a pull, says he,
Lifting th' wooden plug.
Pulls be th' divil, says he;
An' winkin', he says, says he,
As findin' is kaping, we'll take it along
To see phat our loock'll be.

Locked in a sixh by three,
Mac shook his aching knob;
The spalpheen wus funnin' Oim thinkin', says he,
Talkin' av pulls, begob.
The Yankees be smart, says he,
Oim thinkin'—he says, says he,
Fer sorry th' face in coort saw Oi
That looked loike wan to me.

ORMSBY A. COURT.

Younger Sister (sentimentally): They say love is blind.

Elder Sister: And dumb, too, I think. — *Harper's Bazar.*

SHODDY.

The amalgamation of the 'Serpents," "Wassups" and "Lobsters" was satisfactorily affected last week. Several minor organizations were taken in at the same time. The present "Chief" of the Serpents will become the head of the entire order, but with all due respect to him, he scarcely approaches the ancient ruler.

The fire escape is growing rusty for want of use.

While one of the instructors was dividing atudents, into sections, prior to drawing various parts of a loom, he accidently omitted the name of a certain student, who at once began to go through a series of Indian dances, joyfully exclaiming that he was "*let off.*" The instructor, however, in looking over the names, put an end to his frantic maneuvers, by telling him he was quite correct and could sketch the "*let off*" motion.

"Stickenlooper gets his money's worth whenever he buy's a newspaper."

"In what way?"

"He can read any joke four times before he sees the point."—*Puck.*

Lowell Textile Journal.

SOME COTTON GOODS OF GREAT BRITAIN.

By C. P. BROOKS,
Director Lowell Textile School.

In the present day British cotton manufacturers fabricate an endless variety of goods. Their cotton cloth is distributed over all parts of the globe, and they have, therefore, many customers to please. The gaudy cheap print is produced to attract the eye of the African, while a fabric strong and durable has to be provided for the Australian squatter. The English house-wife requires sheetings and pure cotton shirtings, cretonnes, and cotton dress goods; the mild Hindoo only wants a strip of cheap fabric to cover his nakedness, and thus they have to give him the shirting, or, if his means can afford, the striped dhootie.

Beautiful muslins and lawns, "white as driven snow," are produced for the harems of the East, and a cotton "blanket," through the centre of which the South American or the African negro may put his head, has also to be provided for his wants. New requirements are found, new markets discovered, and every year adds to the number of the products in cotton fabrics. Necessity for cheapness of production causes some to be made, as, for instance, the "split" cloth now produced in large quantities, which consists of two narrow print cloths woven together, and thus one weaving, one sizing, one printing, gives the same result as twice the number of operations previously did. Imitations of more expensive fabrics increase the number of cloths, as shown in the cotton velveteens now made instead of silk pile fabrics, and the heavily-sized shirting, one-third of its weight being size, which possesses the feel and appearance of an all-cotton cloth.

Printing cloths engage a large number of looms, mainly in the

Burnley districts, where a cheap variety known as "Burnley lumps" are produced in quantity. The best varieties are made in the north-east corner of Cheshire and in the parts of Lancashire and Derbyshire contiguous. Printers are mostly narrow goods from 30 to 36 inches wide, the principal lengths being 75, 116, and 130 yards. 64 × 64 and 68 × 68 are frequently Burnley makes, while the Cheshire printers are frequently 76 × 88. These cloths are exported to all parts of the world, the best varieties being used to a large extent at home. Splits are a variety of printer, and consist of the narrowest widths of the latter, such as 18, 20, 22 and up to 30-inch printers, formerly woven separately, and now woven double width; thus a 44 inch split is really two 22 inch printers. Down the middle of the cloth a few dents are empty, and the centre selvage is generally formed by a special motion, which twists the threads on each side of the space in a suitable manner, so that when the cloth is slit down the middle it will not ravel. The muslins are an important branch of industry; in this are included the coarser varieties, such as tanjibs, jacconets, medium qualities such as mulls and cambrics, and the finer book tarleton, leno and other muslins.

Almost all these goods are bleached before being exported. The destination of these coarser varieties are India, China, Japan, the Mediterranean, Turkey and Persia. The fine qualities are also sent there in less proportion, but they are principally used in Great Britain and her colonies, and on the Continent. Tanjibs are generally below 40 inches in width, jacconets and mulls from 36 to 50 inches while the length of each is about 20 yards. Finer muslins vary considerable in length and width. The reed and pick and yarns in the coarse muslins go as low as 48 × 48 30|40,s, while the finest may be as high as 180 × 180.120's warp 150's filling.

Tanjibs and jacconets are chiefly made in Lancahshire, but the finest varieties are produced in Glasgow. Muslins are the oldest established fabrics in the cotton trade with the exception of fustians. Shirtings are produced perhaps in greater quantities than any other cloths; they are made in many qualities, varying from almost pure varieties to those of which one-third or more of their bulk is size — the latter being a necessary evil brought about by the demand in India, China and Egypt for a cheaper fabric than could be pro-

duced out of pure cotton, equal in feel and appearance to the real article, the practice commencing at the time when cotton was so dear during the Cotton Famine. The best qualities of shirtings are made in Preston and district, and, to a certain extent, in Blackburn.

Shirtings are made always in lengths of 37½ yards, or thereabouts, and vary in width from 32 to 54 inches for India, the bulk being between 36 and 42 inches. China shirtings are generally 38 inches and over. The shirtings are exported also to Turkey, Egypt and Japan in comparatively large quantities.

Dhooties now form an important branch of the weaving industry. Though long made in India and used there as an important article of attire for generations, they were only made in small quantities prior to 1860, when Glasgow had the monopoly. About that time they were introduced into Blackburn, and are largely made there and in Great Harwood and Preston. The feature of this cloth is that it has a border, generally of colour, running along each selvage of the piece; this varies in width from ¼ in. to 4 in. Of late years the Blackburn manufacturers have introduced figured borders.

The word "dhooty" is derived from the Hindoo "dhona" to wash, so named from its being washed daily at the time of bathing. It is an article of male dress. It is worn round the loins, and forms the loin cloth which is so much adopted by the Hindoos. The sarrie is a similar cloth worn by the female Hindoos. It being of considerable length, one portion is worn hanging from the waist to serve as a gown, while the other end is carried over the head. The red-bordered sarries are worn by Hindoo and the black by Mahommedan females. The silk-bordered dhooties of Nagpore, in India, hand-made and very expensive, are worn among the better classes. It is not surprising that the exports of cotton fabrics to India are so large, when we remember that in addition to the dhooty or sarrie most of the natives wear on the head a turban, containing 10 or 12 yards, and a doputta of 8 yards, round the upper part of the body. Dhooties are made in long pieces, but divided every few yards into scarves by extensive coloured headings; narrow dhooty scarves are only about 2½ or 3 yards in length, wider widths being 4 or 5 yards between the headings. The counts of these cloths vary considerably, from the

cloths resembling shirtings to those of similar character to fine mulls and cambrics.

The T-cloth and Mexican trade requires attention next. There is a large export trade in these goods to Persia, Arabia, India, China, and South America. Twenty-four yards is the usual length of these goods, and the widths range from 26 to 40 in.

These are only a few of the infinite varieties of goods manufactured in Great Britain and exported by the millions of yards weekly to all parts of the globe.

The time will come when many such fabrics as these will be made in the United States — when the export of cotton from American shores will be in the form of manufactured goods at a high price and not as raw material at a low price — the difference in value remaining here as wages in the hands of the workman, as a means to the desired end. Not the least important factor is a system of textile schools which will be an investment for the city, the state and the country, that will return its capitalization a hundred fold and increase the manufactures and find more remunerative employment for the workman.

The *Citizen* says editorially: Our Textile School is safe; it will have a $15,000 appropriation as it ought to have. It is not a local school, but is general in its manifest benefits. It is not affected by the School Board of Lowell, nor is it like the Normal School, in conflict with any other school. It is under a Board of Trustees most of whom are mill men, and it is free for the laborer and agent's son alike. It is suscepitible to talk which is not always complimentary, but it is idle talk which wise men do not believe. The School is doing much good in textile education, and we need its graduates to solve the riddle which competition in the South has propounded.

The worsted machinery from Prince Smith & Son, Keighley, Eng., has been set up under the direction of Mr. Barker and will be in running order shortly. The delay is occasioned by the non-appearance of a part of the shafting.

This machinery was procured through the kindness of Stoddard, Haserick, Richards & Co.

AMERICAN COTTON MACHINERY

For the Preparation and Treatment of Fibres and the Spinning of Yarns and Threads.

WHAT IT IS AND HOW TO USE IT.

By CHARLES CLIFTON HEDRICK,
Principal of the Cotton Spinning Department of the Lowell Textile School.

REVOLVING FLAT CARD.

Chapter IV.

The setting, or adjusting, of the flats will next be considered and, as they require to be set with a considerable nicety, too much attention cannot be given this subject. In figures 28, 34 and 35,* the flats are shown as set $\frac{11}{1000}$ of an inch from the cylinder, which is considered about an average setting. As the wire teeth of the flats and cylinder require grinding from time to time, owing to their becoming dulled on the points, from continual use, and, as the grinding operation shortens them slightly, the space between the wire surfaces is increased. In order to preserve the correct relation, between these two surfaces, the flats require to be reset and as the grinding operation affects each of the flats, it will be seen that they must be lowered bodily to the same extent towards the centre of the cylinder; this is accomplished by changing the radius of the surface upon which they are supported, which is called the flexible bend.

On sheet number 18, two styles of bends and adjustments are shown, one called the plain and the other the scroll adjustment. In the plain adjustment, the bend, A^{10}, is supported at five equidistant points, A, B, C, D and E. At the points A and E a stud, A^{6}, is screwed into the bend, the outer end of this stud passing through a slot in the stands, A^{7}. In the lower end of these stands is an adjusting screw, A^{9}, which

passes through the web of the arch, A^2. At the points B and D the bend is supported by an adjusting screw, D^2, which also passes through the web of the arch, the upper end bearing against the under side of the bend. At the centre point, C, the bend is supported by an adjusting screw, C^4, which passes through the web of the arch as at the other points, the top end being screwed also into the under side of the bend.

When it is necessary to change the setting of the flats, the adjusting screws at each of the five points, are in turn operated upon, the centre one first and then the end ones. By so doing the radius of the bend is made smaller and the flats are drawn bodily towards the centre of the cylinder. It will

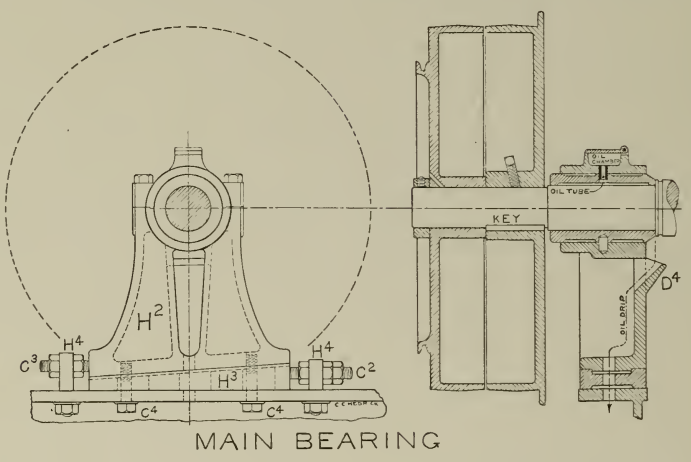
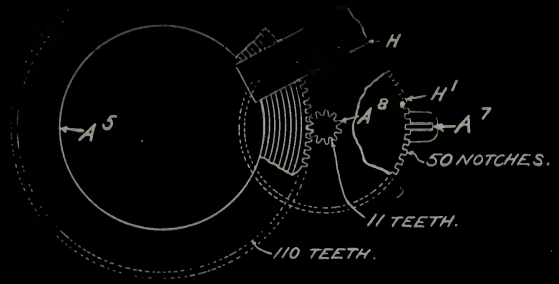


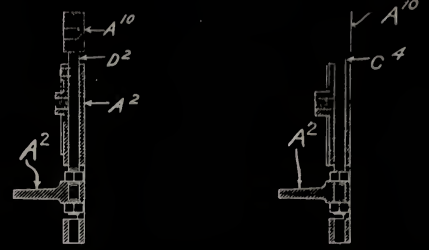
Fig. 36.

be seen that at the centre point, C, the adjusting screw enters the bend so that in lowering it this point must fall radially. But at the points B and D the adjusting screws simply support the bend, while at the ends A and E, the studs, A^6, pass through slots in the adjusting stands, thus permitting a slight movement of the bend, endwise. The reason for this is very simple. As the radius of the bend is made smaller it occupies a greater proportion of the circle, and as the centre point, C, falls in a radial line the points A and E, and B and D must partake of a combined movement, both radically and circumferentially, the slots in the stands at A and E permitting this while at B and D the screw bearing against the under side of the bend offers no resistance to this movement.

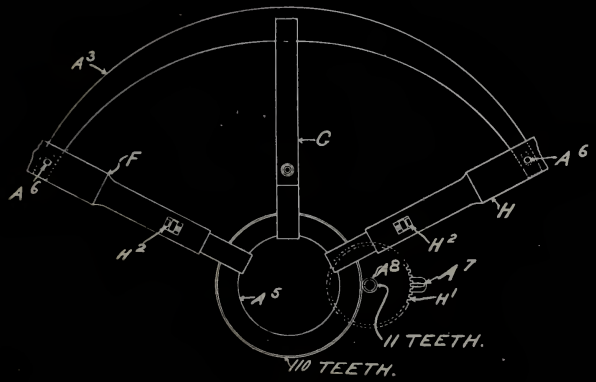
SCROLL ADJUSTMENT

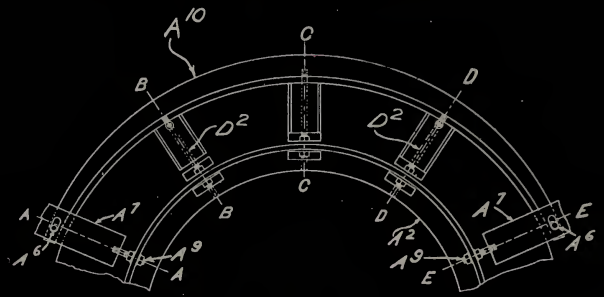
PLAIN ADJUSTMENT

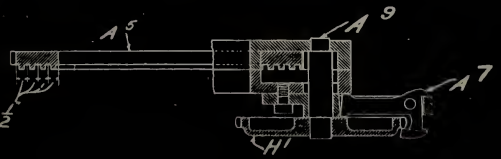


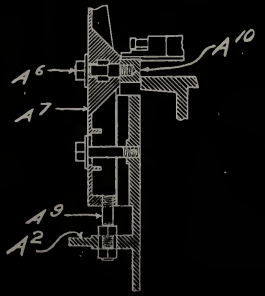


SECTION AT B-B, DD. SECTION AT C-C









SECTION AT A-A, E-E.

FLEXIBLE BEND ADJUSTMENTS FOR REV. FLAT CARD.

SHEET 18.

While many cards are fitted with bends of similar style which undoubtedly have some advantages in being simple in construction, as well as being cheaper, yet considerable time and skill are required in setting, or adjusting, them to obtain the best results.

The second style shown on sheet number 18, which is called the scroll adjustment, possesses the greater merits. The bend, A^3, is supported at three points by arms F, G and H instead of five points as in the plain adjustment, the bend being made proportionately heavier and stiffer. The arms, F and H, are connected to the bend by a stud, A^6, working in a slot. The movement endwise is obtained by having the slot in the bend instead of in the arm. The centre arm, G, is not fastened to the bend, but acts as a support for it. A pin in the arm prevents any movement circumferentially. These arms are made in two pieces, partly for convenience in manufacturing. In order to set them alike, when the card is first erected, adjusting screws, H^2, are provided for the two end ones which, after being properly set, are permanently secured by dowel pins. The lower end of the arms is provided with teeth, or threads, which work in the threads of a geared scroll, A^5, the pitch of which is $\frac{1}{2}$ inch. Around the periphery of this scroll is cut a gear of 110 teeth which is in gear with a pinnon, A^8, of 11 teeth and which is fastened to one end of the stud, A^9, while a notched wheel, H, having 50 teeth or notches is fastened to the other end. By giving this wheel twenty revolutions the scroll is given two revolutions and, as the pitch of the scroll is $\frac{1}{2}$ inch, two revolutions of it would give the arms and bend one inch movement which would equal 1000 notches of the notched wheel. Now if 1000 notches are required to pass a given point, to change the radius of the bend one inch, a movement of one notch will change the radius $\frac{1}{1000}$ of an inch. After the card has been adjusted a latch, A^7, can be pushed between the teeth of the notched wheel and locked, preventing the setting from being changed.

It will be seen, from the drawings and description, that an adjustment of this kind possesses many advantages over the bend, with the five setting points, requiring very much less time to adjust and being very simple in construction, after having been once properly erected,is not liable to get out of order through careless handling.

While a great deal depends upon the careful setting of the flats, many evils arise, such as the wearing of the bearings or the boxes due to the weight of the cylinder, the pull of the belt and various minor causes, which tend to alter the position of the centre of the cylinder, thus destroying its concentricity with the bend. When such wear takes place some means must be provided to restore the cylinder to its concentric position.

In Figure 36, a section and a side elevation of an adjustable cylinder bearing are shown. The cylinder boxes, or bearings, are supported by pedestals, H^2. The lower part of each pedestal is formed by a slightly tapered plate, H^3. Upon either side of the pedestals are lugs, H^4, which are securely fastened to the card side. From the plate, H^3, projects a screw, C^2, which passes through one of the lugs, while from the pedestal, H^2, projects a screw, C^3, which passes through the other lug.

When a vertical adjustment of the cylinder is required the tapered plate is given a horizontal movement, by turning the nuts on the screw, C^2, but when a lateral adjustment is desired, both the pedestal and plate are moved together, both parts being fastened to the card frame by cap screws, C^4.

Sometimes oil, from the cylinder bearings, runs down on the cylinder head, particularly if the card has been standing idle for several days. If this occurs, the oil is apt to get upon the clothing of the cylinder, softening the cement with which the several layers in the foundation of the clothing are stuck together, causing them to separate and puff up in places, thus destroying the holding power of the wire teeth. To prevent this the pedestal is made with a lip, D^4, projecting from the back side directly under the bearing. Any oil that drops from the bearing will be caught by this lip and carried to the outer edge of the card frame as indicated by dotted line.

Financial.—"What's the difference between wages and boodle?"

"Well, wages is money a man earns and sometimes doesn't get; but boodle is what a man gets and doesn't earn.—*Detroit Free Press.*

Mr. Fenwick Umpleby's last lecture entitled: "Color and Woven Design," was delivered before a large audience in the hall of the Textile School.

MEASUREMENTS.

By WM. W. CROSBY, S. B.

Altho' discussions of the abstract, of sub-consciousness, of topicalities and the like, may offer an amount of interest to some people all of the time, and to all people some of the time, yet they do not concern the greater portion of mankind intimately. Man's surroundings deal with the concrete in the main and he, necessarily, yes, constitutionally, must exercise therewith, the functions of the senses wherewith he is endowed.

With the least effort on his own part, and with a minimum of disturbance of the surroundings, the first sense to impress man is doubtless, sight; he sees, and in seeing necessarily compares; for example; to himself he says that an object appears to be twice as large as one beside it, and, the thought suggesting the action, he approaches to compare more closely — in other words he measures. He finds that measurements may be made not of bulk alone, but that everything about him is possessed of dimensions of some sort.

When the man sees, it is form which first impresses itself upon the retina of his eye; thro' his own mind comes the idea of size and here is dimension; then to approach the form requires time. These three elements, mass, size, and time, in their endless number of combinations, make up the sum total of man's knowledge, and he is wise in-so-far as he has deduced the relations between them.

If the first man who had ascertained a truth had kept it to himself failing to transmit the knowledge he had acquired to another, and the same state of affairs had continued until now, the present generation would, doubtless, be a race of savages. It was well said that

> "'Twas ne'er entailed from sire to son,
> Learning by study must be won."

and this truly too; but man has ever had the instinct to make known whatever he has acquired, so that from age to age the sum total of what had been learned of the earth and its forces, was ever on

the increase, thereby enabling man to laugh at the adage; for though inherently he did not know what had been discovered before his day, he found it within his power to acquire all this knowledge and to appropriate to his use such parts as concerned him.

Although it may be argued that the man who asks "why" before "what," is the one with the more truly scientific spirit, yet it must be admitted that pride himself as he will on his inductive reasoning, man has, nevertheless, arrived at the greater part, if ultimately not all of his attainments by the deductive method.

But this is leading too far into the abstract, particularly when it has just been noted that man is more concerned with the other side: so to return to the concrete, it is readily seen that for nearly all of his useful knowledge, man is dependent upon measurements of some sort.

In the case cited above, he may compare the object he sees with another beside it, as being larger, softer, heavier and so on, but if he wishes to describe a third, he must compare it with the same one used as a basis before, if he would have his statement amount to anything: and if he were to tell how far apart the objects were, the number of paces might suffice, while the time elapsed in covering the distance could be defined as an estimated portion of the sun's traverse. It should be noticed that the unit selected must be such an one as may be readily available at any other time; and if the measurements given are to be of value, the unit must be unchangeable.

The common linear unit is the foot, which is supposedly, the length of a man's pedal extremity of the same name. At one time or another this unit has varied from ten inches to twice that amount, where the inch is one-twelfth of the present foot. The standard yard, three feet, is preserved by the British Government as the distance between two engraved marks on a certain rod when the temperature is 60° F.

The French have adopted a standard which is approved by the International Committee, and is of the utmost value in all kinds of calculation on account of its admirable system and the facility with which one set of units may be referred to another. The original linear unit was settled upon as being the one ten-millionth part of a quadradt of the earth; this is called the meter and is engraved on a bar composed of 90% Plati-

num and 10% Iridium, this alloy being quite stable in texture; its section is X shaped. It would seem as if the great care which is exercised to preserve these standards, would be productive of the best possible results, but who can say that the intermolecular structure of the material will not change in the course of time, either to expand or to contract, so that the standard is no more what the name implies, and in time to come, comparisons cannot be made with data obtained to-day.

Various other standards have been proposed, among which are prominent the wave lengths of certain vibrations; but here again a difficulty similar to the one suggested above is encountered, that is, to predetermine the immu tability of the constituents called into action; as the luminferous ether for light or air for sound.

Without doubt the best way to preserve a standard for linear measurement is to use a number of bars made of a variety of materials and by various processes; and then to rely on the probability that changes in these are not likely to occur at the same rate or at the same time.

It may be interesting to note that although the foot or meter is a convenient unit to use in describing machines or buildings, yet distances, when comparatively great, are expressed with far more facility in a larger unit, as miles or kilometers; for a human mind is so constituted that the most of its definite conceptions are those of comparison. When a dimension of two and a half or three feet is spoken of, one naturally thinks of it as being about half his height; or if it be one or two hundred feet, the tendency is to refer the mind to the height of some tower or building; but if ten thousand should be suggested, it would be well-nigh meaningless unless it were to think that the distance were a great one, but great only in the abstract sense, for had the figures been two hundred feet thousand, the idea conveyed would have been about the same; in other words, no direct comparison would be possible. If now, one thinks of the ten thousand feet as being about two miles, there is a ready means of comparison, for the mind by preconception has a definite idea of what the mile is, as for example, the distance between two fixed points, between which the person frequently passes.

The greatest continuous direct distance that can be traveled on the earth is, in round numbers, twenty-five thousand miles, that is

its circumference: this furnishes a basis for comparison where a considerable distance is involved; but man has not been content to confine his thoughts to his own sphere, for, aided by the telescope, he has pierced the immensities of space, and has been enabled to deduce many of the laws governing the bodies which fly through space unhampered, each on its own endless journey. But when a measurement was taken of the distance from the earth to the sun, it was found to be about ninety millions of miles, so far indeed, that it might almost be said to be at an infinite distance, yet this is but a fraction of the distance to the North Star.

It has been shown that light travels at a rate of about one hundred and eighty-six thousand miles per second; at this rate, could a single globule of light, if the term may be allowed, be started so as to travel around the earth, it would complete the circuit seven and one-half times in a second. This suggests a new unit of distance, which we may refer to as a *light-second*, or to extend the principle further a *light-minute*. It requires about eight minutes for the sun's light to reach the earth; in other words, the sun's fire might be wholly extinguished, yet it would appear to be shining for eight minutes thereafter. Even in these terms, it requires so large a number of minutes to express the distance to many of the stars, that the term *light-year* is often used, meaning, obviously, that distance which would be traversed by light in a year, or if we should write it in figures, 5,865,700,000,000 miles for a single year; there are many celestial bodies whose existence may have been *nil* for many decades, yet they continue to shine and will do so for ages to come.

The foregoing has treated in a most cursory manner of principles of a profoundly fundamental nature; yet let it be hoped that some suggestions may have been thrown out from which may come useful thoughts. That which has been said has by no means touched on all the sub-headings of the topic, still less has it approached the discussion of the different kinds and means of measurements that are possible. The subject is one of infinite possibilities, for each point attained *de novo*, is but a stepping stone to another beyond.

If real success is to be attained, the one thing more necessary than all others is truth; not merely to one's fellow men, but rather

to one's self. The mind, the eye, the hand, yes, all the faculties must be trained; but above all the mind must be so disciplined that it will transmit only those impressions that are received from the senses, and, entirely devoid of bias, give its judgment. The fact that from pre-conceived notions a definite result may be expected in a given case, should not compel one to see what he is led to expect for by a strict adherence to the real truth, he may make himself famous as the announcer of some new law. Let, then, every one strive to discipline his mind to see things as they are, and then to use the results truthfully.

The first death among the pupils of the Lowell Textile School occurred early in March taking away one of the brightest and most popular of the evening students, John Halsam, of North Billerica, and of the Talbot Mills.

Although but twenty-one years old he had already started upon a career of rare promise.

A Home Rule candidate in Ireland was engaged in canvassing, when he visiting a workingman's house, in the principal room of which a pictorial representation of the Pope faced an illustration of King William, of pious and immortal memory, in the act of crossing the Boyne. The worthy man stared from one to the other in amazement, and seeing his surprise, the voter's wife explained:

"Shure, my husband's an Orangeman and I'm a Catholic."

'How do you get on together?" asked the astonished politician.

"Very well, indade," replied the lady, "barring the twelfth of July, when my husband goes out with the Orange procession and comes home dhrunk."

"Well?"

"Well, he always takes the Pope down and jumps on him. and then goes straight to bed. The next morning I get up early, take down King William and pawn him and buy a new Pope with the money. Then I give the old man the ticket to get King William out."— *The Wave.*

Author — "How do you like my new play."

Critic — "It's simply great. The robbery in the third act is the most realistic piece of work I ever saw.

"Do you really think so?"

"Of course I do. Why, even the words spoken by the theives are stolen." — *Chicago News.*

We have had so many calls lately for the January Textile Journal, and which we were unable to satisfy, that it might be well to state that we have no copies at hand.

The Lowell Machine Shop is making a new departure and has taken to building some of the machinery required in making worsted yarn.

It will be a feather in the cap of Lowell if the Shop succeeds in placing machines which hitherto have come from Keighley, Eng.

As a great many years of Mr. Umpleby's life have been spent in determining the colors suitable for fabrics of his own designing, it is needless to say that he was thoroughly posted on his subject, and also if the amount of applause means anyting, it must have been a highly interesting lecture to those present.

The L. T. S. Athletic Association has received very substantial help from the Directors. Instructors, and Trustees of the school.

The Journal takes great pleasure in thanking these gentlemen for their generous support.

Mr. Ainley, the assistant instructor of the woolen and Worsted Department of the Textile School has been retained by request when on the point of going to New York.

As Sir Walter Scott was riding with a friend near Abbotsford he came to a field-gate, which an Irish beggar, who happened to be near, opened for him. Sir Walter was desirous of rewarding him by the present of six-pence, but he found he had not so small a coin in his purse.

"Here my good fellow," said he, here is a shilling for you, but, mind you owe me sixpence."

"God bless your honor!" exclaimed the Irishman; "may your honor live till I pay you."—*Argonaut.*

"There are hazards in the game of golf, are there not?" asked the ignorant one.

"Hazards!" exclaimed the veteran. "Well, I should say so. Why, no less than three marriage engagements were announced after the last match."—*Chicago Evening Post.*

It trills the swaying trees through,
It comes with sudden gust;
Wish I could raise a breeze, too—
I'd like a little dust.

THE LOWELL TEXTILE JOURNAL.

PUBLISHED MONTHLY
AT
No. 67 Middle Street, - Lowell, Mass.
BY
THE LOWELL TEXTILE JOURNAL COMPANY.

W. M. HASTINGS, Editor.
A. B. FELS, Treasurer.
E. D. Chase, Advertising Agent.

Entered at the Post-Office at Lowell as Second Class Mail Matter.

SUBSCRIPTION TERMS.

For one year, postage prepaid $1.00
Single Copies 10
For Sale at all Newsdealers . . . . . .

Advertisements must be at the Journal Office before the twenty-fifth of each month for insertion that month.
Contributions may be sent to Editor of The Lowell Textile Journal, and will receive prompt attention.

EDITORIAL.

Mr. Frank P. Bennett is in hot water. If his statements in regard to some of the members of the National Association of Wool Manufacturers are of the same quality as those of his made recently when the Lowell Textile School appropriation was being considered, that august body need have no fears of their evil effects.

. . .

The Massachusetts Board of Trade has been taking time by the forelock in arousing the manufacturers' interest in the coming Paris Exposition. There is undoubtedly a splendid opportunity here offered for advertising the manufactures and products of the United States and which will undoubtedly be taken advantage of to its fullest extent in this section at least.

. . .

Much has been said of late concerning the prosperity of the Southern cotton mills, and it is rather difficult for those wishing to place capital, and looking for information on this subject, or those merely trying to obtain statistics by which to guage the talk on the Northen mill troubles, to acquire accurate information. This is especially true in view of the matter which some of the Southern mills allow to be published.

A record of statistics brought out not long ago on mills in South Carolina, will serve to illustrate this point, and requires scarcely any comment: the figures speak for themselves.

One mill mentioned has a capital of $50,000, 3,744 spindles, 120 operatives, a monthly pay roll of $1,000 and consmues yearly 1,500 bales of cotton. This is run by water power. Average pay per man, $8.33 per mo. At conservative figures the cost of labor and stock is something under $49,000.

while the yarn made, 26s, would yield in gross receipts about $109,000, thus allowing $60,000 in earnings with which to pay insurance, wear and tear, interest on the $50,000, etc. These figures are absolutely ridiculous.

Another set of statements taken from the same interesting source at random, elicits the following remarkable facts:

Capital $500,000, 11,000 looms, 650 operatives, $110,000 yearly pay rall, 9,000 bales of cotton consumed. The average wages per month of each person employed is a little under $15. Labor and stock, conservatively, about $358,000. Add to this $16,000 for power, and against these figures place $600,000 which the 15,000,000 yards of heavy cloth produced would safely bring. This mill, according to these statements, should have $236,000 with which to pay wear and tear, insurance, interest, etc.

No man can expect to know, or has a right to know, the exact facts of a case of this sort, but he should be supplied with something that sounds reasonable.

. . .

THE SCHOOL TEAM.

The first ball team of the Textile School contains the following men: Capt. Colony, p.; S. Stuart, c.; Wing, 1st; Ramsdell, 2d; Bailey, s.; Fels, 3d; Thompson, r. f.; McAllister, c. f.; and Hooker, l. f. This is the arrangement up to the first of April. After this date there will undoubtedly be some changes among these men.

The Manager, Mr. Hastings, has already made arrangements for games in April and June.

. . .

It is probable that the Lowell Textile School contains the first cotton gin ever brought into this city. The fact that the cotton seed is separated from the fibre on or near the plantations where it is grown renders these machines useless to the Northen mill man and causes this particular one to be of great interest here. It was manufactured by the Dan'l Pratt Gin Co. of Prattville, Ala., and presented by them through the efforts of Mr. E. P. Dennis of the Lowell Machine Shop. Properly speaking, it is a saw gin and contains fifty saws, also patent revolving head with feeder and condenser.

A five hundred pound bale of seed cotton, coming from the same source, may be seen near the gin. This is also somewhat of a novelty in this section, and it

may be of interest to the uninitiated to learn that when the seed has been separated from the cotton, the latter will amount to only about one hundred and sixty-six pounds, while the seed will weigh in the neighborhood of three hundred and thirty-four. The proportion is about one-third cotton to two-thirds seed.

TEXTILE ORNAMENTATION.

By FENWICK UMPLEBY,
Headmaster of Woolen, Worsted, and Designing Departments of Lowell Textile School, Lowell, Mass.

VI.

Before leaving this subject, we must not neglect to refer more particularly than we have hitherto done to the manufacture of tapestry, which has occupied a prominent position in some of the English workshops. Tapestry is neither weaving in the strict sense of the term, nor embroidery, but a combination of the two; for although worked upon a warp stretched out upon the frame of a loom, it has no weft thrown across these threads by either a shuttle or any such appliance, but the warp is worked in by the needle with many and various colored threads. This art seems to have found its way from Egypt, through Western Asia, to Europe, and, after the lapse of much time, to have reached England, where the handicraft was taken up by the monks, who became some of the most skilled workmen employed in its production. Although some tapestries have been discovered which were undoubtedly woven at an early date, we have no reliable record of the existence of looms prior to the sixteenth century. There have, however, been published several notices which prove that English manufactories existed in the Middle Ages. Matthew Paris tells us that among other things which Abbot Geoffrey had made in the reign of Henry I (1100–1135 A. D.) for his church (St. Alban's) were three reredoses; the first one worked with the finding of the body of St. Alban, the second representing the parable of the man who fell among thieves,

and the third depicting the prodigal son. While in London, Simon (Abbot of Ramsey), bought looms, staves, shuttles and a slay. In 1344 A. D., Edward IV passed a law for the regulation of the tapestry manufacture, and in 1392 the Earl of Arundel disposed by will of the hangings in his castle, which had been lately made in London, in blue tapestry, with red flowers. Later still, in 1595 the Monks of Canterbury manufactured a tapestry hanging for the walls of the choir of the cathedral, which hangings are now at Aix, in Provence. In the reign of Henry VIII, about 1509, a workshop was established at Barchester, in Warwickshire, by William Sheldon, with the help of the master tapestry maker, Robert Hicks, but it was of no importance in an industrial point of view till the 17th century. In the reign of James I, a new factory was established at Mortlake, in Surrey, by a skilled artist, Frances Crane, whose products were patronized by the King, and afterwards by his son, Charles I, for whom were manufactured a great number of hangings noted for their beauty and the excellence of their execution. Amongst other pieces wrought, Charles ordered the reproduction of the fine cartoons of Raphael, representing the acts of Christ and the Apostles. The cartoons had been found in the manufactory at Brussels, where they had been lying forgotten from the time of the production of tapestries for the Vatican, and Charles, by the advice of Rubens, bought them. Most of these pieces of tapestry, especially the acts of Christ and the Apostles, were bought by Mazarin at the sale of Charles I's property after his execution, and have finally found a resting place in the "Garde Meuble" at Paris. The French Government in 1876 sent them to the Exhibition of the History of Tapestry, where in spite of the state of decay, their cleverness perceptible in their manufacture and the taste displayed in the arrangement of the borders which act as a frame, gained the greatest admiration.

The civil wars which troubled England after the death of Charles I, and the Puritanical rule, not only put a stop to the productions of the Mortlake factory, but exercised a most depressing influence upon art generally throughout the country. All the formative arts may be said, for a time, to have ceased to exist, and nothing remained but a never-failing, sparkling stream of poetry to

prove that we have never ceased to rank amongst the most imaginative people of the world. Under happier auspices, however, the artistic sense began again to reveal itself in painting, engraving and some other branches, and these arts have continued ever since to flourish in England and in some cases to hold their own in honorable rivalry with foreign competitors. At the Restoration, when Charles II was put to the throne, the Raphael cartoons, which Cromwell, to preserve them for the nation, had bought at a sale of Charles I's goods were once more sent to Mortlake for reproduction. The looms of the factory were occupied in providing decorations for royal palaces until the death of its founder, 1703, caused a stop to be put to its productions. There was a workshop established in Toho, London, that tried to compete with the Mortlake, and some pieces of tapestry, descriptive of rustic scenes, have been preserved, which were woven in 1758. There was another at Fulham, occupied chifley in producing tapestry for furniture, in the style of that of Beauvais, but this was closed in 1755. After the revocation of the Edict of Nantes, a French refugee bought a tapestry manufactory established in England and transferred it to Exeter, where for a time it prospered, with some help of some artisans from the Gobelins. Since that time England has entirely ceased the production of the high class storied tapestries, and has turned her attention to low warp carpets, as well as to really woven tapestries, and to many other branches of artistic manufacture. But, although the weaving itself of textile fabrics has reached an unsurpassed degree of perfection, the art of ornamenting them can scarcely be said to have surmounted the disastrous consequences resulting from the civil wars, and the Puritanical rule of the 17th century. Yet with out a revival, our textile industries cannot hope much longer to maintain their position in the foreign market; hence the paramount duty incumbent on our manufacturers, master weavers, and others interested in the commercial prosperity of the country, to leave nothing undone that will tend to develop and foster a genuine artistic taste among the people, and especially among the intelligent artisans employed by them, for we must confess that we have a great amount of labor and study to pass through before we can reach, much less surpass, the skill and taste displayed by our forefathers.

HECTOR ON LOOMS.

It is always advisable when fastening the buckles of the harness straps to have the heddles on a level, as it is easier to adjust them when in this position, and it insures a more even movement of the harness.

The next point is to notice that the screws that fasten the straps to the collars of the harness roller are level with each other, — that is, the screws at the front are level with those at the back. Now work from this point and keep your harness level, for on this depends the evenness of your shed. Turn back the lay until the harnesses are on the full open shed. Notice whether the yarn on the bottom shed is resting heavily on the race plate or not. If it is, then raise the harnesses a little, and allow the yarn to barely rest on the plate, for when cloth is being woven it has a tendency to draw the yarn up, and it is best to have a little clearance of the yarn from the race plate, as the constant oscillation of the lay would tend to chafe the yarn.

In altering the harness straps, always bear in mind that if the three points mentioned, are level at the proper time, the best results will be attained. Particularly is the loss seen when the screws on the harness roller are not level, that is when one strap is further round the collar than the other. This will cause an uneven movement of the harness.

Say, a multiplier is a hard thing to understand, isn't it?

Ans. Yes, but when you look at it in this light that there are two small levers that do the work, one over the chain and one over the place for the third riser on the box chain, the difficulty is very much minimized.

On the gingham loom there is space for only two risers to work the boxes for the changing of the filling, therefore the third is to change the multiplier. We should also understand that a riser on the box chain means that the multiplier works because it raises one end of the slide that is under the pawl, so it must throw the other end down. This lowers the pawl on to the ratchet and as the arm that works it moves forward the

rachet turns. Both of the pawls work in this manner, so you naturally see that a riser on the chain under the lever that changes the slide, must cause the other barrel to work, and if you have no riser on the bar the pawl cannot work because it is held out of place by the action of the slide.

THE "TRAMP" OPERATIVE.

He is aptly named, this careless, happy-go-lucky, migratory, fly-by-night type of mill operative, and, be it said to his credit that, conscientiously or not, his mode of living shows a marvelous adherence to the principles embodied in his appelation.

What an odity he is; he cares for nobody or anything; he travels continually; one suit of clothes is all that he can wear at a time, and he never uses a trunk because a newspaper more fittingly meets his needs. Inately he is sharp, shrewd, and crafty, with a decided penchant for always looking out (from his point of view) for No. 1. Constant friction with the world has developed the latent rascality that we all possess, and as a rule he is as smooth of tongue and as full of deceit as opportunities permit or occasions demand. What kind nature has neglected in his physical makeup is of little moment

to him, apparently, or if it is he heroically conceals his chagrin like his modesty and bashfulness, under an impenatrable mask of indifference and poorly nurtured whiskers.

His nomadic existence gives him rare opportunities to observe life in all its various (principally) shades and shadows, and he is invariably an adept at adopting and adapting the cream of his experience to the detriment of those with whom he comes in contact. He eats and sleeps when his other engagements permit. He drinks, like a man who is always bound by a time limit contract. Undoubtedly he is seen at his best when applying for a position. This is the moment when his native wit expands and his concealed abilities develope. It is for this object that he concentrates all his usually dormant energies, summons that marvelous strategic strength which has made him an opponent fearful, and then with a *coup d' etat* that would him make famous in any prominent walk of life, he lands his desideratum and disappears to the nearest cafe to recuperate.

But with all his popular human weaknesses he has some redeeming qualities. For instance: He is generally an exceedingly clever, capable workman, and although he has no more respect for a position than he has for the person who refuses him a drink, one can rest assured that he will not flunk before the first pay-day; after that his moods are as variable as a New England writer's. He is not penurious despite the odor of his pipe. He is a most versatile story-teller, and the jaunty insouciance of his manner has a fascination *sui generis*. At the card table he is irresistable, and among the ladies—he would be a favorite did

he not have such a habit of seeking fields afresh. Generally he is a genial jollier with a taking air that if it does not create immediate friends at least serves to make his memory dear.

In conclusion be it said that it is extremely doubtful that the progress of humanity or the ravages of time will ever have a retrograde influence on this bizarre specimen of the manufacturing community, for, despite the temptations, the schemes and plots of designing reformers that have beset his rocky path for decades, he has remained true to the precepts that have enrolled the tribal name on the scroll of history. C.

John Allen of Mississippi, the wit of the house, arrived at the Ponce de Leon, St. Augustine, registered, and was assigned to a room. He had never seen apartments so extravagantly furnished. Expensive oil paintings hung on the walls. The bedstead was of mahogany and hand-carved. Carpeting a half-foot thick covered the flooring. There were vases filled with flowers, velvet covered chairs, lace curtains, beveled mirrors, and all the other appliances of modern convenience and luxury. John became alarmed. He figured it out that that room would cost as much per day as his salary as a Congressman would amount to in half a week. He called a bell-boy, gave him two dollars and told him to quietly find out the tariff on that room. John didn't like to ask the clerk himself. He was a big man and that would look little. The boy returned

presently and informed the guest that the price was fifty dollars per day. Allen went downstairs, laid down a dime and called for a cigar. They didn't sell anything but two-bit cigars. He put down a nickel on the news-stand and picked up a New York paper. "Twenty cents more, please," said the clerk. He got a drink and tendered fifteen cents. "Where you been stopping, at the Windsor?" asked the barkeeper. "Drinks here are a quarter." That settled it with Allen. He went to his room, gathered his grips and took himself downstairs. Then he called for his bill. "Why, what is the matter, Mr. Allen? We thought you were going to spend some time with us?" asked the clerk. "Very sorry," replied Mr. Allen, "but I have just received a telegram that calls me away." The clerk reached out his hand to tell him good-by. "But the bill?" inquired Allen. "There isn't any bill. You are the guest of the manager, Mr. Seavy." But Allen had to make the bluff good, and he left on the evening train.—*The Wave.*

SHODDY.

T. P. four or five times, just behind Willie Chase, is guilty, under provocation, of decorating subjects, not *from*, but *in*, life, and with a brush which to say the least was somewhat damp and lurid.

REWARD $10.00.

Ten dollars reward is offered for the apprehension of the man

who uttered the following words on Friday, March 18, "Wouldn't this be a peachy afternoon to flag the school and play ball."

A reasonably stormy meeting was held in class room A the other afternoon to decide on the fate of the class of '99.

Hook toyed with the chalk.

Joe came out on top of the pile as President; Gus, Vice Pres., I think he's a Wassup; and Hastings, Sec. and Treas. Executive Committee, Hooker and Cuttle.

Raggles — "I hear that Tom Attocans is run down and is taking a rest at the Island."

Taggles — "Well for myself, I don't much fancy a(r)rest."

The following men were elected at the first year class meeting: S. E. Smith, Pres.; J. F. Syme,

Vice Pres.; J. W. McAllister, Sec. and Treas.; and Messrs. Spain, Stitt, Brickett, and Thompson for the Executive Committee. The committee for considering the Athletic Association constitution were chosen at the same time and consists of Sturet and Colony.

Wing is a red hot first-base man.

Smygithe wishes to know if Joe Bailey is going to play Short or Half Sho(r)t.*

*Editor's Note—Joke: All laugh.

Who was G. Washington? When anyone sings this in the subway a portion of the ceiling falls in the weave room. I wonder why.

The piratical colors recently chosen at a school meeting are something fierce to say the least.

One of Hooker's arguments against green and gold was that no one could wear green golf stockings. Well, I am waiting now to see him come to school with some crimson ones on. A very remarkable bet has just been made in the Studio, on these same stockings; odds are being given that he decorates them with either black spots or rings.

The purple cow is destined for athletics.

A SUMMER LAY.

Adown sweet meadows flecked with white,
Where brooks and birds, and shadows play,
And sunkissed grasses nod and smile,
I love to while away the day.

Midst fragrant nooks, 'neath shading trees,
On mossy beds of green and gray,
Where cooling breezes softly sough,
I love to while the hours away.

But better yet, believe me well,
For I've been lying in this lay,
The place where I love best to while,
Is in my bed the livelong day.

—ORMSBY A. COURT.

Several clergymen boarded a street-car in Boston one day, and one of them hearing that Wendell Phillips was in the car, got up and asked the conductor to point him out. The conductor did so, and the minster, going up to the orator, said: "You are Mr. Phillips, I am told?" "Yes, sir." "I should like to speak to you about something, and I trust, sir, you will not be offended." "There is no fear of it," was the sturdy answer, and then the minister began to ask Mr. Phillips earnestly why he persisted in stirring up such an unfriendly agitation in one part of the country about an evil that existed in another part. "Why," said the clergyman, "do you not go South and kick up this fuss and leave the North in peace?" Mr. Phillips was not in the least ruffled, and answered smilingly; "You, sir, I presume, are a minister of the Gospel?" "I am, sir," said the clergyman. "And your calling is to save souls from hell?" Exactly, sir.' "Well, then, why don't you go there?"—*Argonaut.*

When Charles R. Thorne, Jr., was doing utility at the Boston Museum in the early sixties, he married the daughter of a well-known Boston detective officer named Calder. Afterward he came to California and did not return to Boston for some years. When he was a leading man, Calder went into an apothecary store of Orlando Tompkins, then one of the lessees of the Boston Theatre, and said: "I understand Charley Thorne is coming back to Boston." "Yes, was the reply of Tompkins. "Coming back to support Booth, is he not?" "Yes," was again the answer. "Well," drawled out Calder, "if he doesn't support Booth any better than he supported my daughter, he'll be durned poor support."—*Argonaut.*

"Did you know that dynamite was invented in 1848?"

"No; was it as long ago as that? By the way, have they found the first fellow who tried to thaw it, yet?"—*Cleveland Leader.*

Lowell Textile Journal.

LENO CLOTHS—A BRIEF PRACTICAL ARTICLE

By W. NELSON,

Principal of the Weaving Department Lowell Textile School.

It is sometimes hard to understand the distinctive difference between the two fabrics, Gauze and Leno, but when we realize that there are three cloths which are taken as foundations of all woven fabrics, then we can judge under what heading a Leno fabric can be classed. The foundation cloths are, plain, figured and gauze, and Lenos are a combination of these three cloths. That is, there is plain cloth, figured cloth, and gauze cloth used in a finished Leno. These three foundations are not used in every case, but two of them must be, that is plain and gauze, and when making an elaborate design then a figure is introduced and in that case all the three foundations are used.

When any one article is the combination of a number of parts, then to produce such an article, especially when it is intended to be a commercial commodity, skill and delicate workmanship is required. Particularly is this the case with regard to Leno cloths. It is a necessity that the outlines of the Leno threads be as near perfect as possible, because a Leno cloth, more so than any other fabric, depends upon its pleasing effect for it to have a ready sale, for in general, it is used as a trimming over some other fabric of a solid color, hence the necessity for its outlines to be pleasing.

Fig. 1 makes a very pleasing Leno stripe. It is a two doup Leno and can be woven on 13 harnesses and from the following counts of yarn: for the threads in the centre of the Leno stripe 2–80^{s} and two ends through one

harness eye, using 16 ends to make the stripe, 8 for the ground threads and 8 for crossing threads. And for the cord net stripe 2–20^{s} bleached yarn using the same

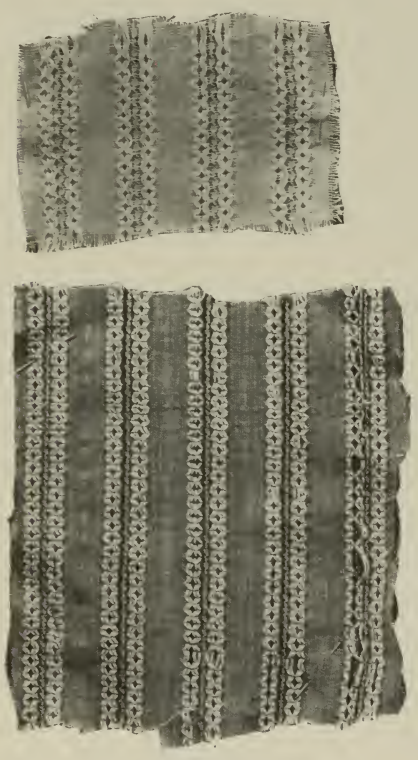


Fig. 1.

counts of yarn for the ground threads in the net stripe as is used for the plain stripe alongside the Leno. The plain stripe of 28^{s} yarn.

To make the cloth more pleasing a colored filling could be used which would make the bleached cord stand out more prominent.

**Fig.* 2 is the draft for the same.

The 1st and 2d are the 1st doup and standard harnesses.

The 3d and 4th are the 2d doup and standard harnesses.

The 5th and 6th are the harnesses for weaving the plain stripe.

The 7th and 8th are the harnesses for ground threads for 1st doup.

The 9th and 10th are the harnesses for crossing threads for 1st doup.

The 11th and 12th are the harnesses for ground threads for 2d doup.

The 13th is the harness for crossing threads for 2d doup.

It will be noticed that the 9th and 10th and 13th harnesses are called the crossing thread harnesses, although in the doup it is the straightest thread, but a glance at *Fig.* 1 will dispel that illusion, because in that case the crossing or Leno thread is the one that actually performs the crossing operation. It is necessary when making out the draft for the one that draws in the warp to show the exact manner in which the ends are drawn through the harnesses.

Both of these are bottom doups,

*NOTE—The pegging plan is turned half around so as to have that particular harness lifted for those number of picks, also the marks for pegging plan are the same as on the draft, as follows; / Crossing threads, \ Ground threads, X Easers, X Standards, O Doups, |Plain stripe ends.

that is the doup shaft is at the bottom and has to be raised by the head motion, and when drawing in the yarn for a bottom drop the ground threads have to be drawn over the top of the crossing or Leno threads.

It may be best to state right here that a Leno cloth is the result from the crossing of a number of threads and being held in a crossed position by the strands of filling that forms the cloth.

same doup. By reason of this, fact, that as the drop and crossing thread harness lifts for one pick then the crossing thread that passes through the right hand loop will be drawn to the right of the ground threads, and the left hand thread will be drawn to the left of the other ground threads, and when the crossing pick has to be placed in, then the doup and standard will raise, and the cord that passes through the

Fig. 2.

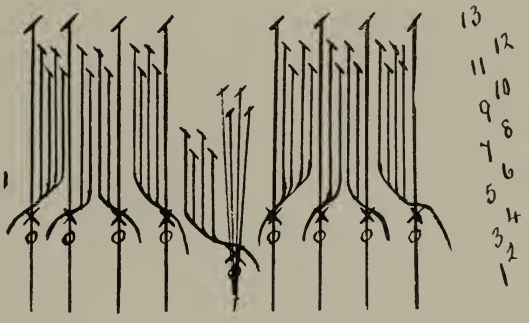


Fig. 3. Chain Draft showing how the harness is lifted.

The 1st doup is a right hand doup, that is the loop is to the right side of the eye of the standard.

The 2d doup has right and left hand loops. The fall commences with two left hand loops then two right hand loops, the same as the opposite side of the stripe. The reason for having right and left hand loops on a doup, same as the 2d one, is, so that diamond or any other figure with both sides the same, can be made with the right loop will be drawn to the left of the ground threads, and the cord that passes through the left loop will be drawn to the right of the ground threads.

It will be noticed that the crossing thread harness is placed at the back of the ground thread harness, and that the ground and crossing thread harness for each doup are placed together. This I consider to be the best method because the further back you have the crossing thread, this is of

course within reason, then there is less strain both on the crossing thread and ground thread, for it is an undoubted fact that if you could place the crossing thread 7 in. back from the doup there would be less strain on the ground threads when the standard harness lifts, than if the crossing thread harness was only 3 or 4 in. back from the doup. And this is the greatest consideration in the weaving of Lenos to have as little strain on the yarn as possible, so as to save the doup and prevent as much as possible the breaking of the yarn.

As before stated a Leno cloth being the result from the crossing of a number of threads, then there must be a greater or less amount of sawing and chafing on the yarn, particularly when the crossing pick has to be placed in.

It is claimed by some that it is best to have the crossing thread harness inside of the ground thread harness, but I believe that detrimental from this standpoint, that when the standard and doup lift, then the crossing thread passes underneath the ground thread and if the ground thread is behind the crossing thread there is the greater tendency for the crossing thread to lift up the ground thread, and if this is done the result will be a smaller shed than would otherwise be the case if the ground threads remained in their normal position, and this will also cause more friction on the yarn. But by adopting the method of having the crossing thread at the back, when the doup and the standard lifts the yarn crosses close to the eye of the ground thread harness, thereby having less tendency to raise the ground threads. And I most certainly advocate the placing of each ground thread with its own crossing thread, as being easier for the weaver and the less liability for making mis-draws, and also the greater distance from where the two threads cross to the doup. In some cases, particularly where it requires a large number of harnesses to form the pass, and when there are two, three, or four doups, it is often found necessary to have one or more of the doups on the top. This is particularly the case when skeleton harnesses are attached to the doups. It gives greater space for the doups and prevents the lay banging against them, but where it is possible to use the bottom doup it is always best to do so, for the best results are most certainly obtained from the bottom doup.

An explanation of the pattern shown.

It requires 10 picks to weave the part.

For 1st Pick. The 1st doup and standard is raised, also the 5th harness which is for the plain stripe, and one of the ground threads for the 2d doup, 12th harness.

For 2d Pick. The 1st doup and standard, 2d plain stripe harness No. 6, also the 2d doup and crossing thread harness, Nos. 3 and 13.

For 3d Pick. The 1st doup and standard No 5, also the other ground thread for 2d doup No. 11.

For 4th Pick. The 1st doup and one of the crossing threads No. 10, and a ground thread for the same No. 8, also Nos. 6 and 12 harness.

For 5th Pick. The 1st doup and the other crossing and ground threads for the same Nos. 7 and 9 also 5 and 11.
doup, and as the centre threads weave plain for 7 picks then the doup must be lifted for the same, because to make the plain cloth it is necessary that one of the ground threads and one of the crossing threads be lifted together, and as the 7th, 8th, 9th and 10th harnesses have these threads through them, then you would lift the 8th and 10th for one pick and the 7th and 9th for the next pick and when the crossing pick has to be placed in then the doup and standard are raised together, the ground and crossing thread harnesses remaining down. These are in this position for 3 picks.

But for the 2d doup and standard, these are only raised when it is necessary to spread out the cord ends and in the meantime the ground threads are weaving plain, but whenever the doup and crossing thread is raised for a net Leno such as the cord is, then all the ground threads remain down, and also when the standard and doup raises the ground thread and the crossing thread harness remain down. It must also be understood that whenever the standard and doup raises the easer rod must also raise.

This Leno is woven wrong side up.

For 6th Pick. The 1st doup and Nos. 6, 8, 10 and 12 harnesses.

For 7th Pick. The 1st doup and Nos. 5, 7, and 9, also the 2d doup and standard.

For 8th Pick. The 1st doup and Nos, 6, 8, 10, and 11 harnesses.

For 9th Pick. The 1st doup and Nos. 5, 7, 9 and 12 harnesses.

For 10th Pick. The 1st doup and Nos. 6, 8, 10 and 11 harnesses.

It will be readily seen that the 1st doup which is the centre thread of the Leno stripe, is always lifted, this is by reason of the fact that whenever a crossing thread is lifted the doup must also be lifted, for the threads themselves will not lift up in the

[To be Continued.]

Herr Jan Szczepanik has invented a telelectroscope, which will not make possible the instantaneous reproduction of manuscript at any distance, but it will print them upon photographic plates. If the first copy of a paper as it leaves the press is inserted in Herr Szczepanik's apparatus, it can (the inventor tells a *Daily News*' representative) be reproduced by photography the next moment in New York, Bombay, or Sydney. Telegraphy will thus become a thing of the past, and even the telephone, which at a great distance is a worry for those who have to work it, will be cast aside. Herr Szczepanik is a young man of twenty-five, handsome, dark-eyed, with a head of curly hair, and a simple and gentlemanly manner. Another invention of his which is already being worked in Germany is one to simplify the manufacture of designs for woven materials — carpets, tapestry, brocades, silks, and cottons — by means of photography. The Bank Union of Barmen has purchased this invention, and is introducing it into all the German textile works.

Not So Mad.

When the Earl of Bradford was brought before Lord Chancellor Loughborough to be examined upon application of the statute of lunacy against him, the Chancellor asked him: "How many legs has a sheep?" "Does your lordship mean," answered Lord Bradford, "a live or a dead sheep?" "Is it not the same thing?" said the Chancellor. "No, my lord," said Earl of Bradford; "there is much difference, a living sheep may have four legs, a dead sheep has only two. There are but two legs of mutton, the two fore legs are shoulders."

Industry.

If you have great talents, industry will improve them; if moderate abilities, industry will supply their deficiency. Nothing is denied to well-directed labor; nothing is ever to be attained without it.

Sir Joshua Reynolds.

WORSTEDS AND WOOLENS

By EDGAR H. BARKER,

Principal of the Wool and Worsted Departments.

There are probably no two branches of Textile Manufacture about which there is so much confusion as Worsteds and Woolens. Many people who have a perfectly clear idea of worsteds, do not have a proper conception of woolens and vice versa. A few of the popular ideas about the two are as follows;

1st. That the difference between them is in the length of the wool, that is, the long wools are made into worsteds, while the short wools are made into woolens.

2d. The wools used for worsteds are carded and combed, while those for woolens are carded only.

3d. Woolens are milled or felted, while worsteds are not.

Before discussing these ideas, let us divide worsteds into three classes, viz.:

(*a*) Yarns spun from long wools (six inch staple or over) which are prepared, combed, drawn and spun.

(*b*) Yarns spun from short wools (one and one-half to six inch staple) which are carded, combed, drawn and spun.

(*c*) Yarns spun from either of the above classes, but of inferior quality and rarely very long, which are carded, drawn and spun.

To the first class belong the lustre wools, mohair, alpaca, etc., (mohair and alpaca are not, strictly speaking, wool, but they are treated like wool, and come under their class. Mohair is the hair of Angora goat, and alpaca is the hair of the Llama) used for lustre dress goods, plush, etc.

To the second class belong the wools used for worsted dress goods, worsted coatings, trousering, hosiery, etc.

To the third class belong fingering or knitting yarns, and low carpet yarns.

Mr. W. S. B. McClaren in his excellent book, "Spinning Woolens, and Worsteds," defines worsted yarn as "thread spun from wool, in which the fibres are arranged so to lie smoothly in the direction of the thread, and parallel to each other"; and woollen yarn as "thread spun from wool, in which the fibres are arranged so as to lie in every direction, and to cross and overlap each other in

such a way that they may present their serreted surfaces in the greatest variety of ways. This crossing and overlapping of fibres is the characteristic of woollen yarn." (Note: English manufacturers spell woolen, woollen.)

From these definitions it will be evident that the difference between the two, is the mechanical arrangement of the fibres, due to the processes to which the wool is subjected. This difference is brought about by the two great

FIG. 1.

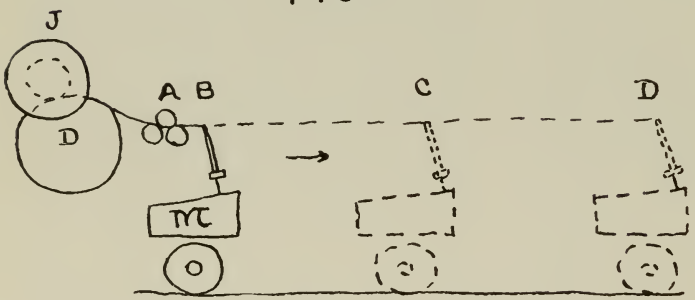
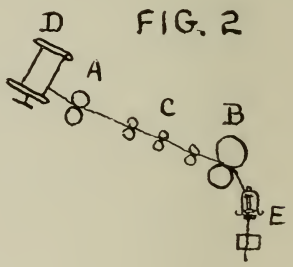


FIG. 2



principles known as "spindle-drawing," and "roller-drawing."

Spindle-drawing is used in the woolen process and briefly is as follows:

In Fig. 1, suppose J represent the Jackspool on a woolen-mule, let A represent the rollers and M the carriage, and D the drum upon which the jack-spool revolves. Suppose the rollers at A to deliver roping just as fast as the carriage M travels in the direction indicated by the arrow, until the point C is reached; and let the distance from B to C equal one yard. Suppose the spindles begin to revolve just the instant the rollers at A commence to deliver, and continue to revolve; the only effect on the roping will be the twist put in by the spindles, there will be no draft; when the point C is reached, let the rollers at A stop; and let the carriage continue to travel to the point D; the spindles still continuing to revolve, and let the distance from C to D equal one yard. Then while the carriage is travelling from C to D, draft and twist are being put in at the same time. The draft will be two, one yard being drawn into two yards. When the point D is reached let the carriage stop; and the spindles continue to revolve until all the twist necessary is put in; now the carriage travels back and simply winds the spun yarn in the bobbin.

Let us now consider the effect on the yarn of putting in draft and twist at the same time. There will evidently be a compound motion, one of which (the draft) will be in the direction of the axis of the thread, and the other (the twist) at right angles to this; the resultant motion will be such as to cause the fibres to assume the shape of a cork-screw or spiral, and this spiral will be a different shape for all fibres whose lengths are not the same in the same thread. The moment the draft and twist begin to act together, the fibres are forced to move according to their length, the longest towards the centre of the thread to form the core, by virtue of their length, and being wound around each a greater number of times than the shorter fibres. The rest of the fibres arrange themselves according to length, around the core, with one end in the core, and the other standing out from the surface of the thread and forming the fringe or fuzzy surface which so easily distinguishes a wollen from a worsted yarn.

Roller drawing is used in the worsted process and briefly is as follows:

Suppose A to be the back rollers of a worsted fly-frame, B the front rollers, C the carrier-rollers, and D the roving. Let one yard of roving pass through at A and let the front rollers at B revolve at such a speed that ten yards of yarn will be delivered while one yard is passing through A. Then there will be a draft of ten. When the yarn emerges from B it is wound on the bobbin, and in being wound on, the twist is put in by the flyer, for one revolution of the flyer one turn of twist is put in, so that if the flyer made one hundred revolutions while the rollers at B delivered ten inches, the twist would be ten turns per inch. The rollers at C simply guide the wool from A to B.

Now let us consider the result of putting the draft in first, and then the twist. The draft acting along the axis of the thread will tend to lay all the fibres parallel to the axis, and when the twist is put in the action will not be on the individual fibres, but on the thread as a whole, causing it to assume a form like a twisted rope.

Whenever draft and twist are put in, in any of the operations in worsted, they are put in separately, first the draft and then the twist. In many of the operations draft alone is put in, and is always between two pairs of rollers, and never between one pair of rollers and a spindle as in woolen. Thus the whole tendency in all the worsted operations, is to lay the

fibres smoothly and parallel, and in the direction of the draft, and this parallelism of fibres in the direction of the thread is the distinguishing feature of worsted yarn.

We are now in a position to discuss the three popular ideas before mentioned.

The first which deals with the length of the wool is incorrect, because short wools are made into worsteds, as well as woolens, and long wools are made into woolens, as well as worsteds.

The second which considers combing as necessary to worsted, is wrong, for class (C) of worsted yarn is seldom almost never combed.

The third which has to do with milling or felting, is not true, for although nearly all woolens are milled, many worsteds (notably coatings) also are slightly milled, to make them firm.

Thus we have shown that the difference between the two is in the mechanical arrangement of the fibres in the thread, due to spindle-drawing in woolens, and roller-drawing in worsteds.

Why then is some wool made into worsted, while other is made into woolen? It depends wholly upon the kind of cloth desired.

Prof. Beaumont says in substance: "The method on which the worsted thread is formed causes it to be capable of sustaining more tension in proportion to size or thickness than the pure woolen. This characteristic combined with its lustrous quality, gives it a pre-eminent position in the manufacture of fine coatings. A finer cloth, possessing a brighter and clearer surface, is certainly produceable with worsted than wih woollen yarns. There is more scope for pattern production with worsted than with woollen yarns. The worsted thread produces a clearer, smarter texture and is suitable for trouserings and coatings, while the woollen thread is more suitable for cloths in which the colourings of the pattern require to be well blended together, the texture fibrous, or the fabric well milled; such as, fancy tweeds (both Saxonies and Cheviots), and the thick, heavy cloths, comprising doeskins, meltons, pilots, naps, and beavers, and also fine twilled goods of a buckskin and venetian class."

ENTRE NOUS.

Go thou sweet violet and tell
What I and thou alone doth know:
And if, I know she loves thee well,
Yet, if her cheeks at thee doth glow,
Come thou to me and whisper low.

C.

COLOR AND WOVEN DESIGN.

By FENWICK UMPLEBY,

Principal of Designing Departments of Lowell Textile School,

What are the principles of color and woven designs? There is nothing that gives us as much satisfaction as to be able to unravel what appears complicated, to diminish or make less than which is apparently numberless and to make plain those points which were involved in obscurity.

There are certain elements capable of admiting combination amongst themselves, that suffice to create ornaments, and these creations may be multiplied indefinitely — the innumerable methods which man has invented, and will continue so to do for the beautifying of his dress and person owe their existence to one of the five following principles: Repetition, Alternation, Symmetry, Progression and Confusion.—

Repetition. The simplest mode of decorating a surface is by the repetition of any given figure.

Alternation. Is a blending of repetition and variety. Alternation is the succession of two different objects recurring regularly in turn; a stripe of green by the side of a stripe of red and repeated across a fabric, is an alternation of colors— in fabrics alternation is gained by the mere contrast of brilliancy and dullness, as a black dress has stripes of a satin-like lustre, alternating with stripes of a dull tone like velvet. Sometimes the alternation is so complicated that the same figure or same color only recurs after several others, but always in regular order and at equal distances a band of yellow for example, will be followed by three bands, one of light green, one of red, and one of light blue, and this order being repeated across the full width of the fabric, the band of yellow supposing it were the 1st in order, will reappear the 5th, 9th, 13th, 17th and so on. Unity (yellow) may in this manner alternate with different numbers, but only on condition that these numbers shall not exceed ten, otherwise we should not be sensible to the alternation.

Symmetry. Is composed of two parts which have been united down a central line, and these two parts, alike, without being identical, correspond in such a manner

that the right side if folded over the left would cover it exactly, in the same manner as one hand can cover the other. We give the name symmetry to any disposition of several objects arranged in a perceptible and pleasing order. One method of introducing symmetry into an ornament which as yet is only marked by repetition, is by introducing intersection — the design of a figured dress pattern, whether it be simply repeated or its effect heightened by alternation must be symmetrical, because the eye likes to find either in the intersection of the dominant lines or in a central figure, the diagonal if it is rectangular and the point of convergence of its rays, if it is circular.

Progression. Let us suppose a series of colors from the darkest to the lightest, disposed in stripes on a surface which we wish to ornament, ranging for example from the darkest violet to the most brilliant yellow, or if we please, from simple black to pure white, we shall have here an increasing progression.

Confusion. A fine disorder is often an effect of art. Every day, we see confusion in fabrics, the astrachan fur naturally curled. The sole beauty consists in the confused arrangement of the hair, irregular ringlets, turning in every direction. Confusion in nature, variegated granite, leaves of trees, irregular views and unexpected touches of color in marble. In the hands of the designer, confusion is only a method of rendering order invisible in a happy disorder. Such are the principles of decoration, they are either repeated, or alternated, or symmetrical, or progressive, or thrown into a confusion which is redeemed by a latent equilibrium.

But each of these principles is accompanied by a secondary element derived from it, and which, multiplying the resources of the ornamentist, allows him to give an infinite variety to his combinations.

To repetition belongs consonance.

It is remarkable, says Bernardin de Saint Pierre, that the most beautiful harmonies are those which have the most consonance. "For example, nothing in the world is more beautiful than the Sun, and nothing is more frequently repeated than its form and its light. It is reflected in a thousand ways by the refraction of the air, before it has risen and after it has set, by rain in which its refracted rays form a bow of many colors, the sombre and uncultivated earth again reflects it in the transparent particles of grains of sand, micas

crystals and rocks. Consonance is shown in the blending of warm colors with cold tones and cold colors with warm tones.

However little taste the house decorator or the upholsterer may possess, they generally contrive to have an echo to the dominant color of the furniture in their other colors. The border, for example, the yellow curtains of a room furnished in green, with a green stripe and *vice-versa*, the tassels and braid of green furniture they cover with yellow. If they cover the walls with a hanging or paper, they are careful to choose a distinctive border, in which, nevertheless, the most striking colors of the hanging will re-appear in such a way as to soften down the contrast by harmony. But it is especially in dress fabrics, that harmonious repetitions are essential, while at the same time, there must be some intermixture of dissonance, delicately managed or skilfully accomplished.

To alternation belongs contrast.

If you make a red stripe follow an orange stripe in a stuff, you simply produce alternation; but if the stripes so placed are the complementary colors one of the other, as orange and blue, yellow and violet, red and green, you will have a most lively contrast. In the same way a series of circles and ovals would only present alternating forms while a circle and a rectangle, cube and sphere, would be decidedly contrasting forms.

Contrast is then the highest degree of alternation. Nature uses it to distinguish her harmonies. The verdure of the pastures, contrasts with the color of the ruminating animals, spotted with white, fawn color brown or black. Flowering plants have, doubtless green leaves, but there is no natural flower, of which the color is green, so that the black ground which throws the flower into relief is at once brought to mind by a consonance, and so distinguished by a contrast.

Man cannot always imitate nature in the arrangement of his ornaments.

To adorn and ornament is not simply to cause them to be seen, it is to cause them to be admired, it is not simply to draw attention to them, it is to lead the spectator to regard the object or person beautified with feelings of pleasure. If contrast is needed, let it be used on condition that it be used as a means of rendering the whole more powerful, brilliant and striking.

If orange must predominate in a decoration, let blue be mingled with it, but sparingly, so that the complementary color, orange, may

be its auxiliary and not its rival. A contrast of round and angular shapes would be displeasing if one of these forms competed with the other in importance in volume or in extent.

Do you wish to give depth to a hall already deep, make it narrower, and the contrast obtained by the loss of width will increase the depth.

In music the accompaniment is a mode of contrast which supports the melody without overpowering it. In the dramatic art, when the poet mingles some comic incidents with the most harrowing scenes, his aim is not to vary the impression, but to render sorrow more sorrowful, and tragedy more tragic.

To symmetry belongs radiation.

The spiders' web is a tissue whose threads radiate, the ocean is peopled with ray-like zoophytes, such as star fish and sea anemones, everywhere the dandelion flourishes with its golden rays, the Easter daisy, the blue-bell, and the periwinkle adorn the fields and the woods with their star-like corollas.

Why then should not the textile ornamentist count the radiated form among the elements of his art?

To progression belongs gradation.

Progression may be animated and even irregular, gradation is never so.

The one resembles a slow, almost imperceptible advance, the other a series of steps which may increase or decrease rapidly.

In ascending or descending the scale of colors, like the gamut in music, if we pass from violet to yellow through all the intermediate hues, garnet, red, deep yellow, orange and saffron, and if we descend from yellow to violet by sulphur, green, turquoise, blue and sky-blue, we shall have an increasing and decreasing progression. But if you suppose all these colors slightly modified with black and white you will obtain for each of them a dull half tint, which making the color vibrate on itself, would render the transition from the one to the other softer.

Light green would precede pure green, which, followed by dark green, will melt more easily into the varieties of blue. What was a progressive disposition will become a shaded gradation, like that which leads us through dawn to daylight, and through twilight to night.

(To be continued.)

Wife (enthusiastically)—"How much do you think we took in at our last bazaar?"

Husband (quietly)—"How many you mean."

—*Cleveland Plain Dealer.*

THE LOWELL TEXTILE JOURNAL.

PUBLISHED MONTHLY
AT
No. 67 Middle Street, - Lowell, Mass.
BY
THE LOWELL TEXTILE JOURNAL COMPANY.

Entered at the Post-Office at Lowell as Second Class Mail Matter.

SUBSCRIPTION TERMS.

For one year, postage prepaid $1.00
Single Copies 10
For Sale at all Newsdealers . . . . . .

Advertisements must be at the Journal Office before the twenty-fifth of each month for insertion that month.
Contributions may be sent to Editor of The Lowell Textile Journal, and will receive prompt attention.

EDITORIAL.

The first, but we hope not the last volume, that will leave the pen of a Lowell Textile School man will appropriately be the work of the director. For some months prior to coming to Lowell Prof. Brooks had been engaged on a book dealing with raw cotton, its cultivation, baling, compressing, and commercial handling, the suitability of cottons for various yarns and goods and other details of cotton and its uses. The heavy duties and untiring attention necessary in connection with the school caused him to put aside this work for a year or more, but he has delivered the substance of the book in the form of lectures to the first year men during the last winter and these have been much appreciated. The volume will be published in June at $3.00 and will consist of 350 pages, with about 150 illustrations mostly full page plates.

. . .

The New England Cotton Manufacturers association held their semi-annual meeting in Boston on Wednesday and Thursday, April 27th and 28th, 1898.

This association has had a most wonderful growth—and it shows amazing endurance—it is no institution devoid of vitality. In a short space of time it will enable the cotton manufacturers of the United States of America to out rival any other cotton manufacturing nation on the face of the earth.

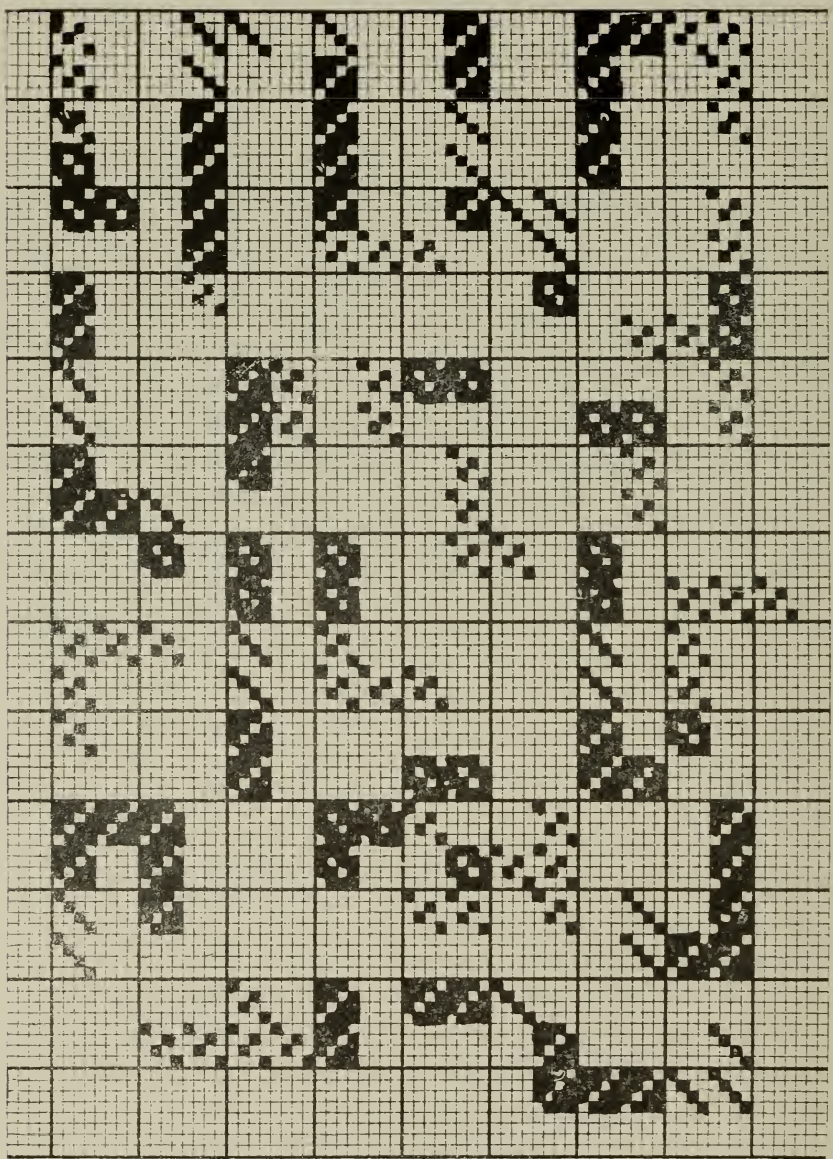
While the country and politicians are wrangling about war —this association goes on in peace and harmony—gaining a power that will be felt around the world.

. . .

The American people are quick to seize an opportunity and to take advantage of the times. This is shown by the fact that enterprising merchants in dry goods are displaying fabrics bearing the national colors in printed or

Design Puzzle No. 1.

(SEE PAGE 20.)



woven designs—and in these days such fabrics command a premium when patriotism is finding so free and widespread a vent.

. . .

The Lowell Textile School is beginning to be one of the "lions of Lowell." It is the custom now for citizens, when they have friends from a distance visiting them, to take them to the Lowell Textile School, as one of the sights of the city. Not only so, but high educational authorities make special trips in order to visit the Lowell school. On April 26th Mr. J. H. Reynolds, director of Technical instruction for the city of Manchester, England, who is in this country on a hurried visit to inspect a few of the leading educational institutions, paid a visit to the school. He devoted an afternoon to the operation and working of the school, and took many notes as to its equipment and management in view of the fact that he is directing the building and equiping of a million dollar textile school in Manchester, England. He expressed great appreciation of the way in which the Lowell Textile School has been equipped in so short a time, and on such comparative small expense. Director Brooks has received a letter from him written from the Cornell University, Ithaca, N. Y., which he has been inspecting, and in which he again expresses his admiration of the Lowell School.

The week previous, Herr Carl Herrman and August Drethelm, two of the leading engineers and manufacturers in Switzerland, who were on a visit to the Draper Co., came to Lowell to see the School, and made some very interesting and pleasing comments on it, and compared it with the school that they were connected with in Zurich, Switzerland.

Among other recent visitors have been Dr. James P. Haney, Director of Manual Training for the City of New York and Engineer J. Bicking of the Societe Alsacienne of Mulhausen, in Germany, and others.

. . .

"It is an ill wind that blows no body good." The war scare is benefiting several of the largest business firms in Lowell. Owing to the wide variety of manufactures and the fact that Lowell is not depending entirely on cotton for prosperity, we are getting a share of the business that has been distributed by the government in connection with the preparations for war.

The Tremont & Suffolk Mills of this city are very busy mak-

ing blankets. Both the Bunting companies have received additional orders for flags, including many Cuban ones; while it is unnecessary to state that a large percentage of the output of the United States Cartridge Co. will shortly go up in smoke.

Notice.

The vacation numbers of the Lowell Textile Journal:—In each issue there will be a few questions or exercises for the student to work out himself. In a subsequent number, complete answers or workings will be given to those questions or exercises so that the student can compare what he has done with the correct solution, and thus ascertain what progress he has made either in the right or wrong direction, and having made this comparison, enter up in his book both his original workings and corrections.

In addition to those lessons and exercises, correspondence columns will be opened to enable any student to submit any question that has any reference to past lessons and exercises in the cloth designing department or to those occurring in the vacation numbers which will be answered by the editor.

By this means it is hoped that the students will be able to render valuable service to each other, by suggesting subjects of study which might otherwise be entirely overlooked, or imperfectly dealt with.

Design puzzle No. 1, is constructed from the 4 harness twill. When complete it makes an evenly balanced checkerboard design, there is an equal number of warps and threads, also an equal number of picks on the surface of the cloth on every side of the design. Complete on 48 threads and 48 picks.

GEORGE DRAPER

was born at Weston, Mass., Aug. 10, 1817, and died in Boston, June 7, 1887. He was educated in the public schools, and worked on his father's farm until he was fifteen years old, when he entered the weaving department of the cotton mills at North Uxbridge, where he remained two years. He was then made superintendent and manager of a small cotton sheeting mill in Walpole, Mass., and soon after that was appointed overseer of weaving in a large mill at Three Rivers. In 1843 he became designer in the extensive cassimere mills of Edward Harris, in Woonsocket, R. I., and in 1845 he was appointed superintendent of one

of the mills of the Otis Company, in Ware, Mass., and a little later was made superintendent of all the mills of that company. In 1853 he removed to Hopedale, Mass., and, in partnership with his brother, Ebenezer Daggett Draper, established himself in a business which has since developed into one of the largest manufactories of cotton machinery in the world.

Mr. Draper was a man of unbounded resources as an inventor, and probably took out not less than a hundred patents in the United States Patent Office.

It has been estimated that through his improvements in high-speed spindles, and the utilization of power, the capacity of cotton spinning machinery has been doubled.

But valuable as was his service, and brilliant as is his example as a successful inventor and manufacturer, it is the memory of the patriotic and unselfish devotion to high ideals of citizenship that this tribute of his associates mainly seeks to perpetuate.

Although he always declined to hold office or accept political preferment, his interest was constant and his influence great in the shaping of public policy and the direction of public affairs.

As the friend and confidant of such men as William Lloyd Garrison and John A. Andrew, he did his full share of the work of anti-slavery agitation, and of the great war in which this agitation culminated. He recruited several companies of soldiers, and defrayed, from his private purse, the expense of their preliminary organization.

With the triumph of the principles for which the war was fought, Mr. Draper identified himself not less directly with the cause of Protection to American Industry. He was the founder and first president of the Home Market Club, and as a constant correspondent and warm supporter of such men as William D. Kelley and William McKinley, as well as in his capacity of a vigorous writer on economical questions, he was long known as one of the ablest champions of this idea.

His public and private charities were bountiful and unostentatious. He considered the comfort and well-being of his employees; the welfare of the community in which he lived.

The biographical notice of Mr. Draper is condensed from "The New England States, their Constitutional, Judicial, Educational, Professional and Industrial History." Edited by William T. Davis. Boston, 1897.

THE BACHELOR.

There was a heart, a heart so free,
(Tobacco and clubs and beer)
That pulsed with the pleasures of song and spree,
Whose only care was the short to be
In its life of laughter and cheer.

There was a maiden, a maiden shy,
(Blushes and smiles and eyes)
Who chanced one summer day to fly
To the beach where the heart was wont to hie,
And they met—Oh, bliss! and lies.

Then came a time when the heart grew rash,
(Kisses caresses and love)
And swore off the pleasures that now did clash
With the pretty demands of its pouting mash
Its innocent white winged dove.

Oh! For an hour that it might flee
(Screeches and yells and fights)
To some beetling cliff by the sounding sea!
For she, is a widow with devils three
And a preacher of women's rights.

ORMSBY A. COURT.

Courtesy.

Does the mill manager make a mistake in personally knowing in a way all of his regular employees? We think not. It is the wise manager who has a kindly greeting for each and every one with whom he comes in contact. He adds much to his popularity and detracts nothing from his dignity by occasionally sparing a moment to chat to this one or that one about their duties. Too often the managerial idea is that the office must be invested with an august dignity the weight of which will create the respect necessary to such a position. If one doesn't possess natural dignity, assume it.

And here, embryo mill-managers is where a great mistake is made. In assuming this desideratum the average man will err in judgment and what he fondly imagines is a most impressive manner, either makes him supremely ridiculous or else a host of enemies. There is seldom a happy medium.

On what does a man, especially a mill man, base the belief that forced dignity, unnatural reserve of manner, austerity, or insolence is an aid to his well being in any walk of life, much less one in which he has to do with many people of different ages and sexes? Whether it is advantageous from several points of view to have a nod, a smile, or a pleasant word word here and there, and make friends of your work people, or to act the opposite with the inevitable result? Help are less difficult to govern when the relations between master and man are of a friendly nature; there are fewer discontents, and even the ever present growlers become discouraged as they realize the impotency of their mutterings. As a rule, help work better for a man they like and respect. There is less inclination to shirk their duties, and a noticeably increased willingness to perform them.

Mentally a mill-manager is, sup-

posedly, superior to his operatives, and his position places him in an entirely different social sphere, but these are scarcely sufficient reasons for his constantly endeavoring to impress his employees with his own superiority and their inferiority. This difference is generally only too well realized; in fact it is in recognition of it that the man among men is so warmly welcomed and thoroughly appreciated.

The textile student need be but a casual observer of men and manners to know the qualities that single out the popular man from among his fellows, and he need not be gifted with an analytical sense of perception to pick out the imperfections in the unpopular. In conclusion: It is a matter that concerns only himself whether he adapts his observations to his own personal uses. It is a question of his ability to minister to his own future welfare, however, if he doesn't. C.

Ladies' Fancies.

The gauze, leno, chiffon grenadines and other tranparent weaves will be found to be very popular in next season's fabrics.

Combinations of blueish-lavender and sky-blue, dark green and turquoise, and old rose are regarded with favor for the coming season.

Grenadines will be the leading favorite for the summer of 1898.

Those with extreme taste should see the Waldorf plaid—it belongs to the "ultras." The square of the plaid is two and one-half inches in pink and green, blue and beige, brown and shaded red, it is so

extraordinary that it is said even against the wind it can be heard ten blocks.

The leading designs in Paris and London are plaids and stripes, combined with very bright colors, but the contrasts are less daring, the combinations have more harmony and the general effect is more pleasing to the trained eye.

Athletic News.

Lowell Textile School vs. Vespers.

The opening game of the Textile School base ball nine was played against the Vespers at the County Club grounds Tuesday, April 19th.

The game up to the seventh inning was very much in favor of the Vespers, but in the last half of the seventh the Textile boys apparently took the Vespers by surprise, making nine runs, and coming within an ace of winning the game.

Capt. Coburn of the Vespers played a great game, and practically saved his team from defeat. Score: Vespers, 20; Textiles, 18.

The students of the Textile School were received with a great deal of hospitality by the Vespers at the Country Club on April 19th.

Only Half Size.

Extensive preparations are being made for the great Paris Exposition which is intended to be opened April 15, 1900, the site is a little under half the area occupied by the Columbian Exposition in Chicago. The Paris Exposition of 1889 had an area of 336 acres, the site for the 1900 Exposition is practically the same. The area of the World's Fair was 740 acres, more than double the extent of the Paris Exposition.

Base Ball.

A very exciting and interesting game of ball was played between the two schools on Wednesday, April 20th, 1898. On account of the very uncertain weather the game had been indefinitely postponed, but as Mr. Jewett the manager of the High School team was very anxious to have the game played, Captain Colony, of the Textiles, after quite a siege of coaxing, finally consented to allow his cotton pickers to take the field. Shortly after one o'clock amid the pulling down of bulletins, which read game postponed, indefinitely, that notorious kicker, and other prominent members of the big nine, scattered in all directions, seeking the men to play in their respective positions. There were one or two subs in the game, but as their work was excellent, the Textiles have nothing to complain about. Most of the Textile boys played in positions entirely new to them, and considering this fact, the boys played a remarkably good game. The features of the game were the batting by Fels and McAllister, the excellent work of Colony at short of the Textiles and very pretty double play by Cronin, Boyle and Jennings of the High School. The outfielding of both teams was very good. Up to the last half of the seventh inning the game was very evenly contested, but in this inning the Textile boys used the stick in first-class style, batting out seven runs, which gave them a good lead as will be seen by the score by the innings below. The High School boys played a hard and plucky game, but the lucky seventh was too much for them. Quite a number of enthusiastic

young ladies were present The Textile boys won the game, and they are happy over the result.

Keep sober boys, keep sober.

The score:

TEXTILES.

	AB.	R.	1B.	PO.	A.	E.
McAllister, c	6	4	2	3	3	1
Fiske, 2b	6	2	2	3	1	2
Fels, p	6	4	4	0	6	1
Stewart, 3b	6	3	1	2	0	2
Colony, ss	5	1	0	0	4	1
Ramsdell, lf	5	1	2	2	0	1
Brickett, m	5	1	0	1	0	0
Wing, 1b	5	2	2	8	0	2
Bodwell, rf	5	1	1	1	0	0
	49	19	13	20	14	9

HIGH SCHOOL.

	AB.	R.	1B.	PO.	A.	E.
Boyle, ss	6	3	1	0	0	1
Morrison, lf	5	1	2	1	0	0
Murray, p	5	1	2	6	9	0
Connelly, m	5	3	1	4	1	1
Cronin, 2b	5	1	1	4	1	1
Jennings, 1b	5	0	0	8	0	1
Mudge, 3b	5	0	0	0	6	1
Gardner, c	5	1	1	2	1	1
Kerns, rf	5	1	2	0	0	0
	46	11	10	22	11	5

Innings	1	2	3	4	5	6	7	8	9
Textiles	3	0	1	1	2	0	7	5	x
L. H. S.	1	0	2	3	2	0	0	3	0

Two base hits—Fiske, Fels, Colony 2, Ramsdell, Boyle 2, Cronin, Gardner. Three base hits—McAllister, Fels. Double plays—Brickett, Colony, Cronin, Boyle, Jennings. First base on balls—McAllister 3, Stewart 2, Ramsdell by Murray; Murray 2, Connelly 2, Cronin 2, Jennings, Gardner, by Fels. Base on pitched ball—Fels, Connelly, Jennings. Struck out—by Fels 6, by Murray 5. Left on bases—L. T. S. 6; L. H. S. 6. Umpires, Scannell and Bailey. Time of game, 2h., 25m.

Attendance 37.

Personals.

Mr. W. M. Hastings has obtained an appointment with the Bemis Mills Co., Bemis, Mass., as assistant to the superintendent and designer. Mr. Hastings was the first student to enter the Lowell Textile School.

Mr. J. Allen Fitts, a former student, paid a visit to Lowell last Saturday. He is engaged with the Sawyer Manufacturing Co., Dover, Mass., as assistant in the designing department.

We were pleased to receive a visit from our late weaving insructor, Mr. Taplin, who is starting up the new Crompton and Knowles looms for the Washington Mills.

We are sorry to hear that Mr.

A. J. Pease has resigned his position as assistant instructor in the cloth analysis department. Mr. Pease intends going South.

Mr. Wittan, superintendent for S. N. & C. Russell, Pittsfield, Mass., called at the Lowell Textile School and was shown the different departments by his step-son. Mr. Wittan expressed himself as highly pleased with his son's progress.

Mr. Harry Russell of Pittsfield, visited the Textile School last Friday.

Mr. Barnes, designer for the Washington Mills, Lawrence, Mass., inspected the different departments of the Textile School last week.

Mr. E. Whitworth has again returned to his studies in the advanced evening design class.

The students of the Freshmens' class were delighted to have a visit from Mr. L. A. Atkins.—Everyone likes Tommy.

The Lawrence boys attending the first year designing class have not lost a single lesson since the beginning of the term last October.

On Friday evening, April 22th, 1898, at the training school, Miss Rebecca Norcross gave an interesting lecture—"A Summer in Norway."

Wit of Richard Brinsley Sheridan.

ROGUE OR FOOL.

One day Sheridan met two royal dukes in St. James Street, and the younger flippantly remarked, "Say, Sherry, we have just been discussing whether you are a greater fool than rogue, what is your opinion, old boy?

Sheridan bowed, smiled, and as he took each of them by the arm, replied, "Why, faith, I believe I am between both.'

COOLNESS.

Hayden, the painter, says that once, when Sheridan was dining

at Somerset House and they were all in fine feather, the servant rushed in, exclaiming, "Sir, the house is on fire!" "Bring another bottle of claret," said Sheridan; "it is not my house."

AMBITION AND AVARICE.

Being asked, "Why do we honor ambition and despise avarice; while they are both but the desire of possessing?" "Because" said Sheridan, "the one is natural, the other artificial; the one the sign of mental health, the other of mental decay; the one appetite, the other disease."

HIS ANSWER TO A CREDITOR.

He jocularly remarked one day to a creditor who demanded instant payment of a long standing debt, with interest, "My dear sir, you know it is not my interest to pay the principal, nor is it my principle to pay the interest.

F. Hainforth.

Fluidity of Different Oils.

M. Charles Levout has compiled the following table, showing the properties and specific gravities of different oils:

Kind of oils.	Specific gravity. Water = 1000.	Degrees of fluidity.
Poppy Seed Oil	939	Fluid
Linseed Oil	932	Less fluid
Rape Seed Oil	931	Less fluid and slimy
Beech Oil	923	Fluid & somewhat slimy
Olive Oil	913	Very fluid at X 15° C.
Oleine	910	More fluid

The Effect of Color.

An interesting illustration of the effect of color is shown by some experiments recently made. It was found that with the same temperature in both rooms, one of which was furnished in blue and the other in red, nearly every person who entered the two pronounced a difference of from four to six degress in heat in favor of the red room. There is something peculiarly stimulating about red. The fact that it can be seen at a greater distance than almost any other color is well known, showing that it arouses the vision in proportion. Blue is correspondingly depressing, these two colors being more decided than almost any other of the list. The advocates of the "new thought," as it is called, look with horror upon the wearing of black as a mourning emblem, or, indeed, as a color for any garb. They would like to bring about a reform in men's dress in this respect, and they unhesitatingly exclaim that putting one's self in black garments affords a distinct armor against receptiveness. It is certainly true that the wearing of black clothes to indicate mourning is being very much lessened. It is certainly true that the wearing of black clothes to indicate mourning is being very much lessened. Where it is put on, it is much more quickly put off than used to be the case. On general principles, this is certainly desirable.

Experience, wounded, is the school where men learn piercing wisdom

Brooke.

Dewey's Victory at Manila.

Air, "Yankee Doodle."

Yankee Dewey went to sea,
Sailing in a cruiser,
He took along for company,
Men and guns, a few, Sir.

Yankee Dewey, Ha, Ha, Ha!
Dewey, you're a dandy,
With men and guns and cruisers, too,
You're certainly quite handy.

He sailed away to the Philippines.
With orders for to snatch them,
And thrash the Spaniards right and left,
Whenever he could catch them.

And Yankee Dewey did it, too;
He did it so complete, Sir,
That not a blooming ship is left
Of all that Spanish fleet, Sir.

Oh, Yankee Dewey, you're a peach,
A noble gallant tar, Sir;
"You're out of sight," you're out of reach;
We hail you from afar, Sir.

We greet you with three rousing cheers,
For you and your brave crews, Sir,
For the deeds you've done and the victory won,
For Yankee doodle doo, Sir.

Yankee Dewey, keep it up,
You certainly are handy,
With men and guns and cruisers, too,
Oh, Dewey, you're a dandy.

Lowell Textile Journal.

OUR EXPORT TRADE IN COTTON GOODS

By CHRISTOPHER P. BROOKS,

Director of the Lowell Textile School, Lowell, Mass.

A paper read before the New England Cotton Manufacturers' Association, in Boston, April 28, 1898,

We know of certain mills engaged for the China, Africa or South American markets, and occasionally read of shipments of cotton cloth abroad especially from southern mills, but these are exceptions rather than the rule, and as a matter of fact, our export trade is very small. In the year 1896, and I would say that in this paper all my figures, unless otherwise specified, will refer to that year because they are the latest available ones that are complete in all respects—in 1896 we shipped out of this country to China 107,063,411 yards, to Canada 35,519,380 yards, to Africa 14,504,407 yards, to Central America and British Honduras 11,720,035 yards, and smaller quantities to other countries. The whole amounted to 281,211,521 yards, valued at $16,245,077. This quantity apparently so large is small when compared with the exports of other countries, for example, the country of Turkey imported from England alone, in the year that I refer to, more than the exports of the United States to all parts of the world. In the same year we exported raw cotton to the extent of 3,030,829,657 pounds. If we figure these as made into 4-yard goods, it would come to about 12,000,000,000 yards, in other words 42 times as much cotton was shipped in the raw state as would have been the case if sent out in the manufactured state.

I don't intend to take up much of your time, or give you more figures than are absolutely necessary, but will now turn to the

question of why we have not a larger export trade. It is not improbable that the reason is simply that we have not cultivated it, that we have been too busy obtaining control of and preserving the domestic market for ourselves to remember that commercially there are other worlds to conquer. Has the time not arrived when American cotton manufacturers should consider the possibility of building up an export trade worthy of the name and the advisibility of promptly making strong attempts to establish an important foreign trade for cotton goods? The question has been forced upon the trade by the addition of new mills, especially in the South, by the use of improved and higher speeded machinery, by the longer working hours of the Southern States, and other causes, resulting in a greater production of goods than the country can consume, and it is no new thing to have to periodically face the question of either allowing prices to be forced down to unremunerative rates or to shut down, which is an unpractical and unpleasant alternative. In any case, there can be little doubt that an efficient remedy would be an increased export trade, not necessarily a trade obtained by robbing other countries of their established connections, nor of causing the stoppage of a single spindle or loom in the mills of competitive nations, such as Germany, England, India or France, but in the United States obtaining a share of the new business that is continually being opened up to commerce by the development of new markets. Statistics show that out of an area of land surface of the world amounting to 52,000,000 square miles, only 8,000,000 has yet been surveyed, leaving a very large amount of territory in which we may presume that immense commercial possibilities remain undeveloped. China, for instance, has an estimated population of over 300,000,000 people. If we estimate that each individual uses 6 yards per year of cotton fabric, then the present imports into China, from both England and America, only supply one-third of her needs. We have only touched a fringe of that country in our attempts at commerce, and the same applies in a still greater degree to Africa. If we refer to the cotton manufactures of other countries, we find that they are largely employed on foreign trade. Germany, India and France, especially the two former named countries, are making rapid strides in

the business of manufacturing cotton goods for export, and Great Britain, outstrips them all.

The British exports of cotton goods in 1896 averaged over 100,000,000 yards per week, they amounting to 5,218,248,600 in that year, when American exports were only 281,211,521 yards.

Not only goods but yarns form an important item of international commerce. In the year that I refer to over 250 million pounds of cotton yarns were exported from Gt. Britain. This is reeled in skeins and made in 10 pounds bundles and baled. Not only is this large amount shipped from Gt. Britain, but India, Germany, Holland and France enter into this international yarn trade. In this matter of export business, I have had very considerable personal experience, having for fifteen years been connected with mills almost entirely engaged in manufacturing for foreign markets, nine years of the time being spent as superintendent and selling agent in such mills.

Now to consider whether we can build up a business of this kind. Perhaps the best method of approaching this question is to face the reasons that are sometimes given as to why we cannot do so. A favorite argument is that we have not got the necessary fleets of American ships to carry the goods, that the fact of having to ship them in foreign bottoms is detrimental to the business, and that foreign ship owners increase business from the mills of their own nations. This argument is of no more value than was the argument used many years ago by German and English steel manufacturers when they said that Americans would never be able to make good knives, razors, and other edged instruments, because they had not the right water to temper the metal with. The argument as to nationality of the ship owner is an utterly unimportant one, and I do not believe that it has any detrimental effect on a possible increase of our cotton goods exports. The ship owner is in the business for what he can get out of it, that is for freight. You cannot imagine the average freight agent for a steamship line from England, Germany or France refusing to carry cotton cloth which was manufactured in America, any more than the American Express Co. would at present refuse to take a case of olives or wine from Boston to Chicago because it was grown or produced in Spain. Another argument is that Americans cannot produce as cheaply as Europeans. While this may have been the case until

a few years ago, and possibly in many cotton goods it is the case to-day, yet I believe that our manufacturers can produce the plain standard fabrics, which form the greater part of the international commerce in textiles as cheaply as any other civilized nation. A high rate of wages per day does not necessarily mean a high cost per pound or per yard, and although we labor under several disadvantages in higher cost of fuel, higher rate of interest on borrowed capital, and considerably higher cost for selling the mill products, and in many ways other expenses that are a heavier burden than fall to the lot of European manufacturers, still skilled management and skilled help reduce the cost per lb. to a minimum.

Now let us take a few reasons as to why we ought to have an export trade. The first and undoubtedly the one reason that overshadows all others, is the fact that we are sending out of the country 3,000,000,000 pounds of raw cotton at from 5 to 7 cents per pound, when we might ship a large portion in manufactured form at from 15 to 25 cents a pound, the balance remaining in the country as wages to help, as interest on capital and as profit to manufacturers, not only on the fabrics, but on cotton mill machinery, supplies and everything that is used in a textile factory. Another reason is that the present system of shipping cotton abroad 3,000 miles to be manufactured, and reshipping it from 1,000 to 8,000 miles to be sold is a wasteful method of manufacturing and distributing goods. Not only so, but the present method of exporting the crop in its raw state necessitates the payment of a much higher rate of freight on the bulky, highly inflammable bales than would be the cost on manufactured goods. At present only one-third of the American crop is used in this country. Two-thirds of it is shipped to England, Germany, France, Russia, India, Japan and other countries, there to be manufactured.

There is no limit to the size of the crop. The South could raise 20 million bales just as easily as 10 million, if the demand existed for it, and we could supply all the other countries with the same amount of cotton as we at present send them, and yet grow a sufficient increase to use in our new export trade without any inconvenience.

I have only gone into this matter somewhat hastily, but some of the conclusions at which I have arrived as to best methods of increasing our export trade are :

First, to improve our Consular service. I do not see how it is possible for a U. S. Consul to be of one-tenth the service to his country in the first four years of his holding the office, as he could in the 2d, 3d or 4th term of four years. As a rule, he enters upon the duties of his office entirely ignorant of the customs of the country and of the language. He is no sooner becoming acquainted with them, then he is liable to be removed and another green officer put in his place. In fact there is no encouragement for him to make himself an efficient official using every effort to help develop his country's trade, as he knows that he is liable to be removed at the end of his first four years' service.

Secondly, I think that the expense of selling American cotton goods ought to be reduced, and in fact the whole system of handling fabrics intended for export revolutionized. Foreign orders usually come in large quantities, and after the business is once established, it needs very little attention as repeat orders are the rule, and there is no reason why a very small commission indeed ought not to be satisfactory to the selling agent in this line of business. The present selling agents are not as a rule acquainted in any respect with goods intended for foreign market, the requirements of foreigners, the methods of handling and distributing textile manufactures abroad, and thus they are naturally timid in any attempt to build up a foreign trade.

Thirdly, the assistance of banks would have to be utilized to a much greater extent, as the credit system of selling on long time is customary in almost all foreign markets, and foreign merchants make a very great convenience of banks. In fact all their business depends on the amount of aid that the bank will render them.

Fourthly, in any attempt at building up a business of this kind, it cannot be too strongly impressed that it is not sufficient to send letters offering the goods, and it is utterly useless to attempt to circularize or draw business by means of printed matter, especially if it be in the English language. We all know how prone we are to throw in the waste paper basket unopened anything that has the appearance of an advertising circular; how much more likely is the foreign merchant to do the same, especially if it be printed in a language he cannot understand.

Fifthly, we shall have to show greater willingness to make the goods that are required, and not

the goods that suit our convenience to manufacture. I have frequently known mills with only two or three hundred looms engaged on export trade with 100 different kinds of cloth in process of manufacture at the same time. It is not at all infrequent in goods for repeat orders to have slight changes made in width, in length, in the reed and in the numbers of the yarn, thus prohibiting the practice of putting goods into stock in anticipation of orders. The foreign buyer is usually very determined in having goods made as he wants them, and not as the seller wants them.

Sixthly, I think the matter depends largely on the manufacturers making up their minds that they will have an export business worthy of the name, that they will not consider it merely a side show to be taken up in dull times, but that they will place themselves in communication with foreign markets, find out the different ways the goods can be sold that their own mills can make and conform to the conditions necessary to do the business.

LENO CLOTHS—A BRIEF PRACTICAL ARTICLE

By W. NELSON,

Principal of the Weaving Department Lowell Textile School.

(Continued.)

When placing in the easing rods for a leno, I always carried out the following rule: To have the yarn that goes through the back doup passing around the back easer, and the first doup threads around the inside easer. So that if anything should get out of order, either with easing rod or standard, the yarn could be more easily traced so as to find out the cause of the disorder.

The easing rods, for the pattern shown in the last issue, would be placed in as follows: For the easing rod marked A, which is used for the second doup, all the yarn on beam A^2 would be raised. This would mean the raising of the harnesses Nos. 7, 8, 9 and 10.

Leaving down all the rest, place the rod A in between the yarn and draw it back to place indicated, and for rod B, raise up the ground threads for the first doup, and the crossing threads that passed around the rod A. This will leave down the crossing threads for doup No. 1. This will mean the raising of the 7th, 8th and 13th harnesses. Place rod B in position, then lower all the harnesses and place rod C in position. Rod C is a stationary, or what is commonly called the standard rod; around this the ground threads for the 1st doup are placed. Fig. 1 shows this.

Fig. 1 also shows a correct method of fixing the beams. Upon the first setting of the doup depends the life of the same, for if a doup is started up in an incorrect manner, it is seldom that a doup will last beyond a week or two, generally by the time that the first piece of cloth has been woven, all the loops of the doups have been pieced over again, and that means extra cost and loss of production, also a greater amount of work for fixer and weaver.

Take a common net leno made with one standard and doup. I have always found that to have the loop of the doup resting easily on the top of the eye of standard harness, the best results have been obtained in this way, that when there has been sufficient slack allowed by the easing rod, then the cord end instead of being half

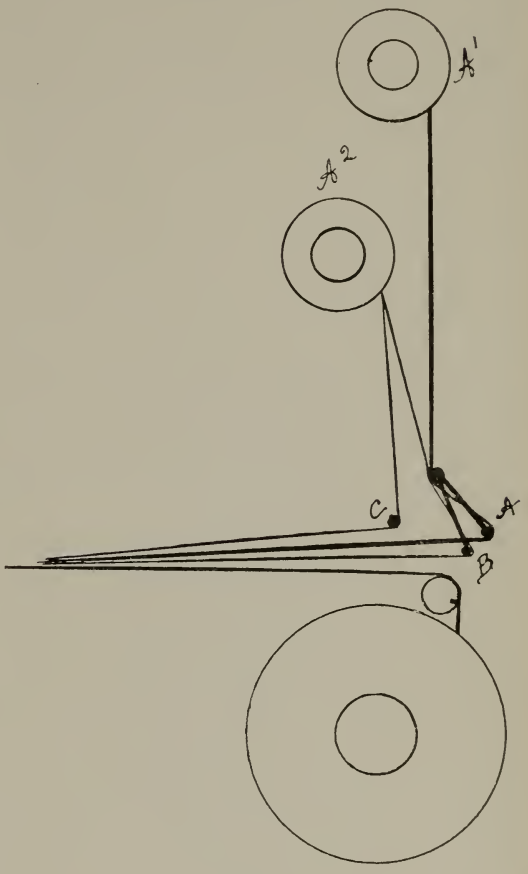


Fig. 1.

way down the eye of the harness or even to the bottom of the eye, it has remained at the top of the eye of the harness, and it will be readily seen that this has caused little or no strain on the doup.

It is best in all cases where it is possible to do so, to set the doup

as already advised, and even where it is required to allow the doup to be a little loose, it is not practical to have sufficient slack doup as to cause the loop to sag down, for it will cause the doup to have all the strain of the yarn upon it, and will also cause a smaller shed, and this is one of the greatest difficulties to be overcome in the fixing of lenos, in fact it is sometimes necessary to make the pick a little later, so as to have a somewhat open shed for the shuttle to enter.

I consider a bottom doup to be the best. They last the longest. They are the easiest to fix when starting up a new pattern, and they are the neatest looking. It is sometimes necessary to have a doup at the top; say for instance, you are making a leno stripe with two or three doups, one of them forming a net stripe, and in the stripe that is weaving plain, a loop of coarse yarn is intended to be formed on the surface of the cloth, then the doup that is forming the net stripe would have to be on the top, so as to show the netting of the cord on the same side of the cloth as the loop.

A bottom doup is one that has the shaft on which the half of a harness, called the doup, is placed at the bottom, and the doup lifts up. This shaft is often called the loose half of the doup.

A top doup is one that is fixed and worked in the opposite manner to the bottom doup.

The reason why I consider a bottom doup to be the best is, that it is natural for the head to lift up the doup and you get a straighter lift, and can also use less spring on the doup, than you can when using a top doup, for it requires extra spring to draw down either the standard and doup, or the crossing thread harness and doup, so as to get the crossing ends down on the race plate, and the more spring you add to the doups or harnesses the greater strain there is upon them, and it is always advisable in any case whether on leno or fancy, to use as little spring as possible.

When fixing up a bottom doup pattern, it will be well to raise the crossing thread harness a little higher than the rest of the harnesses, say from an eighth to three-eighths of an inch, this is because the latter harness is so much further back from the doup, and if the crossing threads are not raised clear, when the shuttle enters the shed, the shed being small at that time, the shuttle would have a tendency to pass over the crossing ends instead of under them.

Never have the easer slackening the yarn more than is neces-

sary, because it makes the yarn slack, causing a baggy shed, and the leno stripe will not be so firm as when the yarn is slackened to the necessary limit.

When the yarn is too slack, and the lay is beating up the cloth, it does not beat up the stripe so firm because there is an increased amount of yarn at that place, and when the easer has returned to its normal position, it draws back again some of the slack yarn, and the result will be readily seen.

When adjusting the shaker device, it is best to spend a moment or two extra in the fixing of the device, for if this is set too soon or too late, the yarn will either be broken out by the shuttle entering the shed, or the stripe will have a curly effect, instead of a firm appearance. If the shaker is lifting the ground thread harness too soon it causes those ends to be higher than the crossing threads at the time when the lay is beating up the last pick of filling.

There is also an item which may seem trivial to the inexperienced person, but it is of great moment to the careful fixer, and that is the tieing in of the lap, that is when starting up a new warp, attaching the yarn to the apron.

When commencing to attach the yarn to the apron, just have sufficient ends as the temple will hold, and tie these to the apron, and when tieing up the rest of the ends have a small number of ends in a bunch, say a number of ends that will occupy about 2 inch space. The reason for this will be clear to the thinking person. If a larger number of ends are tied to the apron than what go through the temple, those in the temple are tighter than those outside the temple, and you readily see what this will cause, then again it takes less length of yarn to start up the pattern.

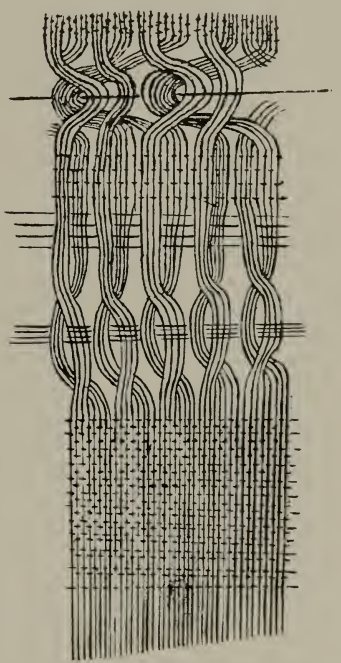


Fig. 2.

The pattern shown as Fig. 2 is quite a complicated leno, it is one that was woven in France.

This will be something for the Design students to figure upon during vacation.

FAULTS IN WOOL

By A. HAW KESWORTH.

In the "Sydney Mail."

Crape Wool.—As the name implies, the formation resembles crape. The curves are small, cling together, are indistinct, and have a confused appearance. Such wools are particularly thin and the qualities appear veiled by the confused formation.

Webby Wool.—The name indicates thinness, lightness, and cloud-like, reminding one of a cobweb. The fibres are very delicate, straight, the curves wide apart and indistinct This class has lost all its quality and is of very little value.

Veiled Wool.—Wool is said to be veiled when its curves are intermixed and scarely discernible. This happens when a portion of the fibres of the same group do not unite to form a staple. These overlaping fibres are said to be veiled.

Plain Wool.—Plain is the wool when the crimps are comparatively straight, or, in other words, wanting in character. The staple formation has ceased altogether, and the fleece is held together by the binders.

Cottony.—This is an objectionable wool, appearing light, fluffy, and handles like cotton. The formation is very indistinct, and, although fine, lacking quality.

Oakum-like.—Such is the term when the curves are flat, the structure lacking uniformity, and the fibres a confused mass.

Fluffy Wool.—The appearance of this type is of a bulky, bold growth; the staples are broad, but thin and light.

Cloudy Wool is a wool with an overcast appearance. The formation is plain and lacks density, although it might appear close and compact. Is wanting in both character and quality.

Wiry Wool.—A most objectionable type. The fibres are thick, straight, hard, and the crimpy structure is lost, and each grows up independently without any form of staple.

Stringy Wool. — This applies mostly to the staple formation, meaning that they are a thin bodied class. The staples contain a small number of fibres, and appear very irregular and sometimes are a little twisted. This is a sure sign of a thin, light fleece.

Curly Wool.—Of all wools this is one of the most objectionable. It consists of most of the imperfections to be found in wool—in fact, it may be said that the wool has changed almost to hair. The curves take all forms, all character is gone, the staples are irregular in length, and have a thin, open growth.

Thread-like. — This name is given to wools the curves of which are misformed and take a spiral form. The strand formation is discontinued, and each fibre grows up independently.

Straight-haired.—When a wool has lost its character it is called straight-haired. The fibres are plain, generally handle hard, and are devoid of elasticity.

Harsh Wool is an unkind, hard-handling wool. Cotty means that the wool has become so entangled and interwoven that it becomes felted and becomes board-like. Such wools are wanting in yolk, and through its absence the fibres cling together and felt.

Noily Wool.—A wasty, fluffy, and perished wool is noily. Noils are combed out of the sound wool by the combing-machine.

The Grumbler.

As instanced by the apple episode in the Garden of Eden, dissatisfaction is the predecessor of sin; and the fact that the diplomatic serpent used it as his *tour de force* establishes beyond doubt that its conception took place prior to the founding and settlement of chaos.

Biblical history enters into no individual detail regarding this satanic remembrance, yet it requires but a brief glance to realize that it was a leading favorite from the start.

Its immediate popularity demonstrates in all probability that it was a necessity, yet as it inaugurated the first dress reform movement amongst the fair sex, it may have been adopted as a fad. It would be a useless waste of time for ordinary beings to formulate or expound any theories regarding the origin or adoption of this subtle force. Psychology might

explain it satisfactorily to its devotees. The cultured professors of our colleges of leisure may be able to convince themselves, when opinions coincide, but their learned ravings but confuse less gifted mortals with a result similar to that produced by their essays on who's who, the labor question, the income tax, and the new woman.

But, *revenous à nos moutons*. Every cause produces an effect, and the evolution of dissatisfaction is the grumbler. Now despite appearances to the contrary, there are many reasons why the inveterate grumbler should not be too severely criticized. For instance: Dissatisfaction being of hereditary source (we transmitted it to Cain who willed it to Noah from whom it descended to perpetuity), therefore to determine or estimate correctly the grumbler's liability to censure depends on whether he is related lineally or collaterally to the Adamses.

The grumbler, or growler as he is more familiarly known, of the manufactory, undoubtably traces his ancestry in an unbroken line of descent from the original stock-father, for he has all the attributes, virtues and qualifications that distinguish the lineal birthmark. He is most readily recognized by his Puritanical adherence to the family dogma. Under all conditions physiological, barometrical or otherwise will he be found at his post, willing to become a martyr rather than sacrifice his principles. His particularly commendable qualities are: His willingness to disagree on everything, his perfect candor and unselfishness in expressing his opinion, the zeal with which he pursues his purpose, his infallibility and the contempt in which he holds those whom bigotry prevents from worshiping at his shrine, his unique love of fair play, deep concern in others' welfare, soundness of judgment and regard for his fellow beings' feelings. Generally he has a poetically fanciful imagination and his airy soarings do as much toward creating innumerable admirers as his impartiality and freedom from prejudice. As an example of a man with the courage of his convictions he stands pre-eminent.

He (it is only the male branch of course that develops active dissatisfaction) may be found of all ages, sizes and shapes, in all grades of mill society and in all positions within factory walls. He is without doubt the most interesting type of the operative world, and, as he has always existed and flourished under the most adverse circumstances as well as the most

beneficial, it stands to reason, as he is progressive, that future generations of employees will see him in a still higher form of development and therefore to so much better advantage. C.

SIMPLE LESSONS IN PHOTOGRAPHY.

Introduction.

The lessons which I propose to follow, are written more for those who know nothing of the beautiful and charming art of photography. It is a maxim generally recognized by those accustomed to teaching that you cannot presume too much upon the ignorance of the student, therefore, in commencing I will assume that the reader has absolutely no knowledge of Photography and that we can commence at the beginning of the subject, so that the details can be dealt with and the practical application shown in the most simple manner. Leaving for a short time the details and chemistry of the subject, we will examine what are the requisite qualifications for a student to possess who desires to be taught the mysteries of the dark room. By experience I know that the beginner is inclined to and does ask questions that later on would be sensible and proper. The tyro is too apt to become an experimenter and will fill his note book with headspliting theories and formulas, too hasty and anxious to wait for development, not patient enough to follow simple instruction, wants to do everything at once. Success comes to those who move only as fast as they learn and understand.

As in all scientific studies, Photography demands certain characteristics, and without which it will be impossible to make success — patience, order, cleanliness.

Photography is based upon chemical changes and conditions, certain qualities of light and heat; these move only so fast and will not be hurried, we cannot make pictures at will, by hurrying things up or by using stronger chemicals in the development. It requires patience to wait for these to work out there own time.

It is impossible to go out any time of day and snap at any view

and get good results. We must study the right time of day, and the proper light, must have patience to study the subject from every side, study the most pleasing point of view, after all this we must have patience in the dark room. Don't be in too great a hurry to see the result of your labor until the place is properly fixed. By using patience the resulting picture will give better satisfaction, the labor bestowed upon the subject will be rewarded. Thus saving waste and annoyance. Look out for quality not quantity.

Order and cleanliness are two absolute requirements. When we take into consideration that in the dark room there may be several operations going on at the same time each requiring different chemicals, etc., and that each chemical is used to produce a certain condition when brought into contact with another chemical, therefore, it is obvious that to bring chemicals together at the wrong time must destroy the work in hand. In Photography particularly does the old adage apply: "A time for every thing, and every thing in its place." Great care must be used to keep the fingers clean by constantly wiping.

Perseverance is by no means the least important requirement. Be patient and persevering. Don't get tired and say, "I guess that has had enough time," or "that will do," such expressions never make a good picture.

Study your subject, time of day, quality of light, use the chemicals as directed by the maker of any special plate, then you will have happy hours in the most fascinating and charming pastime. Along the hillside stream, through woodland and dale, and in fact everywhere, there are beauties hidden from the uneducated eye; but as we take our little walks in the country, along the roadside, camera in hand, we see nature's beauties as we never saw them before, and the more familiar we become with nature's beauties, the more familiar will nature become with us, for the simple reason we never observed, we never searched for them. There is another charm connected with this beautiful art. When we have had our pleasure and satisfaction we can show the results to our friends, then the pictures taken can be referred to in years to come when they will in their unselfishness give us renewed pleasure by reminding us of happy days gone by when we had pleasant walks and talks by the wayside.

THE LOWELL TEXTILE JOURNAL.

PUBLISHED MONTHLY
AT
No. 67 Middle Street, - Lowell, Mass.
BY
THE LOWELL TEXTILE JOURNAL COMPANY.

Entered at the Post-Office at Lowell as Second Class Mail Matter.

SUBSCRIPTION TERMS.

For one year, postage prepaid $1.00
Single Copies 10
For Sale at all Newsdealers . . . . .

Advertisements must be at the Journal Office before the twenty-fifth of each month for insertion that month.
Contributions may be sent to Editor of The Lowell Textile Journal, and will receive prompt attention.

EDITORIAL.

It seems almost impossible that the United States is at war with a foreign power.

For nearly half a century this country has stood steadfastly for peace.

But it is in an effort to discharge the unsought responsibilities imposed by this fact, that the Government, having apparently exhausted the resources of diplomacy, has been obliged to send forth the call to arms.

. . .

War is a calamity at any time, but if ever it is justifiable it is when undertaken for the defense and and relief of an oppressed and perishing people.

Remember the Maine—This is the motto of our brave marines—and it appears to be the only issue upon which they are fighting to day.

. . .

Many of our friends and possibly some members of our own household will be among those who feel themselves called to battle. God Speed the Right.

. . .

The announcement of a naval battle one minute; the capture of some Spanish colony the next; a contradiction the next; June weather as fickle as an April sky; roll of drums and the tramp of soldiers; the distant sound of military music; summer bursting upon us; everything abloom; red, white and blue everywhere; golfers ready for contests; hunters eager for the chase; the merry call of the coaching horn; students eager for the diamond; instructors waiting an advance in salary, and a holiday with all these scenes and incidents crowding the brain, how is it possible to settle down to the absolute duties of our daily vocation.

. . .

It is creditable to the Lowell Textile School students that they

have organized themselves in the right manner in classes.

As a result of various meetings, the class organizations are now completed, and the following officers have been elected:

CLASS OF '99.

President, J. E. Bailey of Waltham, Mass.
Vice President, A. B. Fels of Lowell, Mass.
Sec. and Treas., W. M. Hastings of Bemis, Mass.

EXECUTIVE COMMITTE.

President. } Ex-Officio.
Vice President. } Ex-Officio.
Sec. and Treas. } Ex-Officio.

S. A. Hooker, of Cincinati, Ohio.
J. H. Cuttle, of Lowell, Mass.

CLASS of 1900.

President, Stephen E. Smith, Lawrence, Mass.
Vice President, James F. Syme, of Worcester, Mass.
Sec. and Treas., John Worth McAlister of Asheboro', N. C.

MEMBERS OF THE COMMITTE.

President. } Ex-Officio.
Vice President. } Ex-Officio.
Secretary. } Ex-Officio.

John William Spain, of Quitman, Ga.
Harold Irwin Stitt, of Youngstown, Ohio.
Chauncey J. Brickett, of Haverhill, Mass.
Henry James Thompson, of Lawrence, Mass.

. . .

The Lowell Textile School Athletic Association has had a healthy growth, although there is some room for improvement in the method of handling the opposing teams.

The finances of the Association are in a satisfactory condition owing to the assistance rendered by the Trustees, the Director, and the members of the teaching staff of the school, augmented by an assessment of the members of the Association.

In May the members of the Association met in the school and elected officers for the ensuing year. It was decided to appoint an executive committee composed of students, with two official representatives of the Lowell Textile School. Director Brooks and Trustee E. S. Hylan were chosen to represent the school, and the following students were also appointed on the committee: Jas. F. Syme, of Worcester, Mass., class of 1900; J. W. Spain, of Quitman, Georgia, class of 1900.

J. Worth McAlister, of North Carolina, class of 1900, was elected President of the Association.

Vice President, Stanley A. Hooker, of Cincinnati, O., class of 1899.

Treasurer, Henry R. Bodwell, of Andover, class of 1900.

Capt. of ball team, H. W. Colony, Keene, N. H.

Manager, E. M. Murphy, Lowell, Mass.

Capt. pro tem of foot ball team, A. M. Mann, of Brookline, class of 1900.

Textile Samples.

VALUABLE COLLECTION LOANED TO THE TEXTILE SCHOOL.

The Lowell Textile School has received a loan of a portion of one of the most valuable collections of ancient and modern textile fabrics that exist in America.

For some years, the Boston Museum of Fine Arts has been following out one of the purposes for which the museum was founded to provide opportunities and means of instruction in "drawing and designing, with their industrial application," and its first expenditures for works of art at the exhibition of 1876 were in that direction.

Limited means have hitherto prevented the development of its resources by any considerable purchases, but the administration has kept the object steadily in view. By many recent gifts, and especially by the liberality of Mr. Denman W. Ross, the collection now includes some thousands of examples of silks, satins, brocades, velvets, linens, laces, embroideries and other textiles from all quarters of the globe; early Egyptian and Coptic fabrics, those of the looms of Persia, India, China, Japan and Peru, the handwork of the Turkish provinces, and of many primitive peoples, and is especially rich in specimens of Spanish, Italian and French weaving of the fourteenth to the eighteenth centuries.

It is confidently believed that a study of these selected examples of design and color must tend to elevate the standard of taste and be of great practical benefit to all who direct the arts of dyeing, weaving or printing, and the manufacture of paper hangings.

The samples are mounted on frames, classified and arranged chronologically and by nationalities.

Director Brooks of the Lowell Textile School has been negotiating with Gen. Charles G. Loring, director of the Boston Museum of Fine Arts and is now in a position to announce with the approval of the trustees of the Lowell school, that a very valuable selection of samples from the Boston collection has been placed in the Lowell Textile School, and will be replaced from time to time with other samples. This will give not only the students of the school, but the manufacturers of Lowell and vicinity an opportunity of studying these superb examples of ancient and modern art.

An eye for an eye and a tooth for a tooth, and a whole fleet for a blown-up battleship.

COLOR AND WOVEN DESIGN.

By FENWICK UMPLEBY,

Principal of Designing Depariments of Lowell Textile School.

(Continued.)

To confusion belongs complication. To introduce complication into an ornament is to provoke the curiosity of the spectator, and to rouse him to an investigation which promises to be of interest.

When we examine any work of the Orientals, and study their cords so skilfully plaited, their ornaments in which straight and curved lines intermingle, cross, branch out, disappear and recur, to be lost again and again to reappear, we experience a singular pleasure in unravelling a puzzle which appeared undecipherable, and at a distance, appeared an inextricable confusion.

Colors and forms, so to speak, are the vowels and consonants of the silent language of creation, and both these terms are united in light, which makes us comprehend form and see color, by giving relief to the one, and qualities and shades to the other. Nature does not always employ her two modes of expression, she has not given form to everything, neither has she colored everything. The sky and the mist have colors which are bounded by no outline. Before the sun's disc is visible on the horizon, the dawn displays to us a casket of colors unfettered by any form; so that without traversing any design, the eye may pass from the whiteness of the dawn to the blackness of night, through golden yellow, orange, vermilion, purple, violet and the sombre blue which borders on darkness.

A color, no doubt, is a trifle in itself, and only has its full value when it is in contrast or harmony with other colors.

Nevertheless, between these two extremes — white, which absorbs all the sun's rays, and black, which does not reflect any,— each color has an expression and a character peculiar to itself, and each is enlivened as it approaches its lightest shade by its mixture with white, just as it is saddened and perishes as it approaches its darkest shade by its mixture with black.

Yellow is the emblem of light,

and we must not be astonished if such a nation of colorists as the Chinese look upon it as the most beautiful of colors. Without yellow, no spectacle can be splendid. With it nature has tinged the flesh tints of the races of mankind, with it she has colored the most precious of metals, and those grasses, which contain the most necessary articles of food, the ripe ears of wheat and rye, the seeds of maize, even the grain of barley, and that fine straw which, after having borne the ear. becomes an ornament; when plaited by women it forms hats which shelter them from the sun and cast a golden shade over their complexion.

Striped with black, yellow characterizes the covering of the most formidable of animals and the most venomous of flies, such as the tiger, the panther, and the wasp; and this contrast of black and yellow is also much fancied in countries where the passions are hot and violent. It suits the Nubian and Arab women well, the Spanish women especially favor it, and it harmonizes with the decided character of their black eyebrows and sparkling eyes.

Red is a favorite color with all the nations of the world. As distant from yellow and white as it is from blue and black, it occupies a central position among the primary colors, just as it gives life to the human face by making the circulation of the blood transparent, so it animates all surfaces where it appears. It is by means of red that nature enhances the the most brilliant of her beautiful flowers, with it she arrays the plumage of birds, some have their heads covered with it, like those birds called Cardinals, others have patches on their breasts, others have necklets, others hoods, and others are sprinkled with it, as if a scarlet powder had been blown over them.

The expression of blue is one of purity. It is impossible to attach to this color the idea of boldness or license. Blue is an unobtrusive and imaginative color. It is, moreover, of all colors, that which ascends the highest, and descends the lowest in the scale *chiaraoscuro*. Nothing so much resembles white as light blue, so linen is bleached with blue, and nothing so much resembles black as dark blue. The result is that this color is more susceptible than others of approaching extremes.

The complementary color of blue, orange, corresponds to other feelings. A mixture of light and heat, yellow and red, orange plays a brilliant part in the decoration

of the universe. But in the fabrics for women's dress, orange can only figure sparingly, as an accessory, and by the way of echo or consonance, first, because it enters into two tints of the complexion of those races who are not black, and next, because there is something slightly acid in orange color, just as there is in the fruit from which it derives its name.

The color with which nature has tinted the background of all her pictures, green, is the most suitable ground for other colors. It unites wonderfully well with yellow and blue which have produced it. It heightens red, and there is no flower or ripe fruit which it does not set off to greater advantage, either by analogy or contrast. As it tones down the brilliancy of yellow by the quiet of blue, it is both gay and modest, bright and tender. It is only when combined with black that green becomes symbolical of sadness; it then characterizes the plants which grow among ruins, like ivy.

Between blue and red a color has a place which possesses a striking signification of inflated wealth and of melancholy. I mean violet. It contains the red of life, but red encroached on by blue, and darkened. Violet is more charged with crimson than that of the rainbow, it inclines to purple, and so seems to conceal under an ashy blue the pride and color of red. In its real color, as the solar spectrum presents it to us, violet is a hue which has been brilliant and rich, but is so no longer.

In dress and ornament a color has its proper expression only when it is isolated, or the dominant color, that is to say, when the colors which accompany it are employed to add to its eloquence, and contribute to its triumph.

Here I wish to say a few words on color and fabrics as applied to dress and the complexion, and will ask the indulgence of the ladies as these words are addressed to them.

Amongst primative nations who are more natural, younger, and more under the sway of feeling, the man is almost as fond of color as the woman. The savage seeks to embellish himself by tattooing, the Cacique makes himself a headdress with feathers of brilliant tints; the Moor, the Negro, the Arab and the Indian deck themselves with staring colors. But wherever civilization develops, man abandons color to woman. He himself becomes colorless and sombre, and at the present day

man is dressed in neutral colors and black. But women will never renounce the means of pleasing which color gives them, they will never consent to lay down such a weapon. Although the shades of hair and skin are extremely varied, we may reduce these shades to certain principal varieties, and say that hair of women is black, fair, red, chestnut, or ash colored. To these colors of hair, correspond ordinarily certain varieties of complexion.

It is rare that black hair goes with a white skin, as we have noticed, that the Spaniards and Italians have dark complexions, brilliant and dense black eyes.

The real brunette has a dull and warm complexion, ranging from yellow to orange, and the pupil of the eye stands out on a brilliantly white membrane.

The blonde has a complexion fresh and rosy, delicate and transparent, inclines to fairness.

Chestnut hair matches wonderfully with the color of the complexion common in Europe, the dull and faint red is in perfect harmony with that yellow mingled with half tones of blue grey and rose color which is the usual tint of the skin. Red and sandy hair agree with a white skin and a dazzling complexion, and the eyes of ruddy complexioned people are of a color bordering on chestnut. If fair hair be ash-colored, as if it were covered with a slight layer of fine powder, that fine powder appears also to be sprinkled over the flesh and to soften the eyes and subdue the brilliancy of the skin.

So we see that each temperament has its own harmony ready

at hand, and it remains for each one to render this harmony softer or more lively, to bring out that which is undecided to set off what is insipid, to temper what is harsh, to bring into relief what may please, by subduing what would fail to give pleasure.

These varieties of complexion require varieties of color. Nevertheless there are some colors which go well with all physiognomies, such as black, light grey, pearl grey, which, correctly speaking, are none colors and mixtures; then there are old oak, deep havane and mushroom brown, because they are warm in the shade and cold in the light.

Knowing the law of the simultaneous contrast and optical blending of colors, the effect of white and black in a show of colors, the property that red possesses of surrounding itself with a halo of green, yellow with a halo of violet, and blue with a halo of orange and vice versa, that is to say, the property which each color possesses of projecting its complementary color on the surrounding space, being cognizant of these laws, and knowing what light will set off the complexion to the best advantage, whether sun or gas, morning and evening, each one may at pleasure strengthen or soften, bring into prominence or subdue the natural coloring by the introduction of other colors into their ornamentation.

Whatever may be the flower, ribbon or material chosen, it is important not to forget that variety is the enemy of severity. A single color freely used by itself would be more severe than several colors. For a graceful or fantastic style a mixture of different colors may be suitable, because variety corresponds to fancy, but where we wish for an indication

of character, unity is synonymous with dignity. Repeated with symmetry, or placed in the axis of the head dress, one single color is a dignified ornament, and the effect it will produce is as certain as in another way would be that of a bush of colors.

Anyway, in the choice of colors, warm or cool, brilliant or pale, pure or medium, due regard should be had both to the complexion and color of the hair.

(To be Continued.)

Personals.

Charles H. Allen of Lowell has been elected a trustee of Amherst College in place of Henry D. Hyde of Boston, deceased.

A meeting of the National Association of Woolen and Worsted Overseers was held at the United States Hotel, May 18th. Thomas E. Ainley one of the assistant instructors in the Lowell Textile School, was admitted to membership.

First Brussels Power Loom in England.

Among the models of textile machinery exhibited at the Great Exhibition of 1851 was one of a power loom for weaving Brussels carpet, invented by Erastus Bigelow of Clinton, Mass. This loom was declared to be the first successful loom of the kind ever shown in any exhibition. And this invention brought the Brussels carpet within the reach of even the laboring man.

For years it was the only loom in use for the production of Brussels carpets.

Presentation.

On Monday evening, May 2, 1898, Mr. W. Nelson, Principal of the Weaving Department, in the Lowell Textile School, was given a very pleasant surprise. The members of the 2nd Year Evening Weaving Class met in the weave room and presented their instructor with a handsome parlor timepiece. Mr. J. T. Noble made the presentation. Mr. W. Nelson responded in a few appropriate remarks.

Skeleton Leaves for Lantern Slides.

While I was overhauling some odds and ends the other day to find some old idea from which to try and form a new one for an outline to sketch a design for a figured dress pattern, I came across some leaves which I had gathered on account of their beautiful coloring and natural shading. Among these there were some skeleton leaves I had made years ago. These were so delicate in their outline that I thought they would make good lantern slides. When I placed them in the lantern I was surprised at the beautiful effect they produced.

Here I had all the outline necessary to obtain all the ideas required. The delicate veins of the leaves stood out most clearly, showing the different branches in their various lengths and diameters, giving Nature's information how to copy, construct and design one of her most beautiful creations. The skeleton leaves having been kept between the pages of a heavy book, they were perfectly flat.

It was not difficult to select a suitable mask and bind them between two cover glasses in the same way one would bind an ordinary lantern slide.

These skeleton leaves can be found in damp forests, but they can also be made artificially from the leaf picked green from the tree. To prepare the skeleton leaves artificially they should be macerated in rain water in a warm place. A developing dish is a suitable vessel for the purpose. Let them remain till fermentation takes place, when the soft parts are easily separated from the fibrous by washing in fresh water, blowing very strongly on them, afterwards pouring a small stream of fresh cold water from a narrow spout upon them.

Care must be taken to remove every particle of the decayed parts with a camel hair brush, after which, wash the skeleton leaves in clean water, then with a weak solution of chloride of lime, then mount on paper, place under a guaze wire cover and expose to the sun to bleach. When white enough they must be washed with dilute Hydrochloric acid, one to 60 parts of water, dry and mount as required.

AUNT LINDY.

When the bluebirds are a-singin',
An' th' fields aire all a-bloom,
Arter flies you'll find Aunt Lindy
With her bargain counter broom.

When th' grass aire kinder wilted,
An' th' sun it sorter slants,
Then you'll find her still a-hustlin',
In th' kitchen chasin' ants.

When th' day like ev'ry uther
Moseys off inter th' night,
Then you'll find her with a-candle
Battlin' skeeters til' daylight.

ORMSBY A. COURT.

Centralville Bird Club.

It is very pleasing to know that in Centralville there is such a society as the Bird Club. These young naturalists are up with the lark in the morning.

By the list of birds seen in Centralville during the last month, it appears there are a great number that are not common to us ordinary persons, simply because we do not take our early (4.30 a. m.) morning strolls in the green fields and woodlands.

The following is a list of birds seen by the members of this early-rising and progressive society: Black and white Warbler, Blackburnian Warbler, Black-throated Wabler, Bobolink, Brown Creeper, Broadwinged Hawk, Black Pall Warbler, Black-billed Cuckoo,

Bank Swallow, Barn Swallow-Blue Bird, Blue Jay, Chipping Sparrow, Cowbird, Crow Blackbird, Chimney Swift, Common Crow, Chebec, Chestnut-sided Warbler, Catbird, Cedar Bird, Chickadee, Downy Woodpecker, English Sparrow, Field Sparrow, Fox Sparrow, Flicker, Fish Hawk, Goldfinch, Golden Crowned King, let, Hummingbird, Hermit Thrush, Indigo Bunting, Junco Kingfisher, Kingbird, Maryland Yellow Throat, Myrtle, Night Heron, Ovenbird, Oriole, Orchard Oriole, Phœbe, Pine Warbler, Partridge, Purple Finch, Red-eyed Viero, Red-winged Blackbird, Rusty Blackbird, Robin, Ruby-crowned Kinglet, Redstart, Rose-breasted Crosbeak, Scarlet Tanager, Summer Warbler, Song Sparrow, Sand Piper, Sparrow Hawk, Tree Swallow, Towhee, Tree Sparrow, Vesper Sparrow, Warbling Viero, Wilson's Thrush, Wood Thrush, White-throated Sparrow, Wood Pewee, Yellow-throated Viero, Yellow-bellied Woodpecker.

Lustre is not color; it is intrinsic silvery brightness, not lost in manufacture.

Between good and bad wool in in this respect there is as much difference as between a polished silver plate and a wooden trencher.

He Passed Alright.

"I see," said the citizen to the rural School Commissioner, "that you have given the Blue Creek School to Professor Muttonhead. How did his examination pan out in grammar?

"Putty short."

"All right in figgers, I guess?"

"Not much."

"How about history?"

"Never had heerd o' such a thing."

"Knows how to manage the kids then, I reckin?"

"Dunno 'bout that."

"Why did you give him the school, then?"

"Wal, he promised to make the scholars clear two acres o' my ground that 'long side the skule house while they air takin' recess, an' said he wouldn't mind choppin' a lettle cord wood occasionally hisself."—*Atlanta Journal.*

How to Get an Article Into a Paper.

How to Get an Article Into a Paper?" asked a correspondent of a western journal. "It all depends on the article you want to get into our paper," replied the editor. "If the article is small in bulk, like a hair brush or a tea-caddy, spread the paper out upon

the floor, and placing the article in the centre, wrap it up by carefully folding the edges over it, and tie with a string. This will keep the article from slipping out of the paper. If on the other hand, the article is an English bath-tub or a clothes horse, you would better not try it at all.—*Harper's Bazar.*

More Popular this Summer.

John Bull—What have you done with your ball-bearing bicycle, Uncle Sam?

Uncle Sam (grimly)—I've exchanged it for a ball-bearing rifle. —*Town Topic.*

Not in the Same Class.

Little Bobbie—My mother belongs to the Daughters of the American Revolution.

Little Eddie—That ain't nothin' to be stuck up about. My ma's got a chainless bike.—*Cleveland Leader.*

Her Only Hope.

Jaque—Why does Miss Passey cross the ocean in an American vessel now? Doesn't she know that she is liable to be taken by some Spaniard?

Mazie—Just what she's going for. She has lost hope of being captured by an American.—*Town Topics.*

Chief of Detectives—Why didn't you catch Mag, the shoplifter? I told you how to identify her by her peculiar hair.

Sleuthpup—I guess she changed her switch and threw me off the track.

A certain minister while preaching said that every blade of grass was a sermon. The next day he was amusing himself by mowing his lawn, when a parishioner said: "That's right, doctor, cut your sermon short."

Companions in Misery.

"I do not believe that I have a true friend in the world."

"So you have been trying to borrow money, too have you?"—*Stray Stories.*

Where Most Needed.

Custom (to manager of bargain store—Don't you keep an order clerk in this establishment?

Manager—Certainly.

Customer—Then you want to send him right over to discipline those cash boys.—*Boston Courier.*